



U.S. Environmental Protection Agency

Contract No. 68-W-99-018

PRELIMINARY ASSESSMENT/
VISUAL SITE INSPECTION

DOW CHEMICAL COMPANY
HANGING ROCK PLANT
IRONTON, OHIO
OHD 039 128 913

**RCRA Enforcement, Permitting,
and Assistance 2**

EPA ZONE II



Tetra Tech EM Inc.



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Prepared for

**U.S. Environmental Protection Agency
Waste, Pesticides, and Toxics Division
Chicago, IL 60604**

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EXECUTIVE SUMMARY

Tetra Tech EM Inc. (Tetra Tech) performed a preliminary assessment and visual site inspection (PA/VSI) to identify and assess the existence and likelihood of releases from solid waste management units (SWMU) and other areas of concern (AOC) at the Dow Chemical Company Hanging Rock Plant (Dow) facility in Ironton, Ohio. This summary highlights the results of the PA/VSI and the potential for releases of hazardous wastes or hazardous constituents from SWMUs and AOCs identified.

The Dow facility is a polymeric bead and foam manufacturer in Lawrence County, Ohio, located about 4 miles northwest of Ironton, Ohio. The facility employs about 100 people and consists of three plants including a Styron plant, a Styrofoam plant, and an Ethafoam plant, which produce intermediate polymeric products used or combined with other raw materials off site by other companies to manufacture finished products. Dow began facility operations in 1957 at the Styrofoam plant. Raw materials used in current product manufacture include liquid styrene, ethylbenzene, acrylonitrile, polyethylene, various catalysts and blowing agents, and butadiene rubber. Information on past land uses, owners, and operators is unknown. The facility is currently a large-quantity generator of hazardous waste.

The primary sources of wastes generated at the facility result from (1) cross-contamination of product and heat transfer fluids, (2) process sampling, (3) residuals from process upsets and cleaning, and (4) condensate collection in the process byproduct stream. The majority of the wastes generated are characteristic hazardous wastes (ignitable; D001 and D018). These wastes include partially polymerized wastes, styrene, ethylbenzene, rubber, acrylonitrile, contaminated solids such as gloves, shoes, rags and process feed filter, and styrene/ethylbenzene/Dowtherm/dirt mixtures. The nonhazardous wastes which may contain some hazardous constituents include wastewater, scrap waste paper, wood, foam, and off-specification products.

The PA/VSI identified the following 40 SWMUs and no AOCs at the facility.

Solid Waste Management Units

1. Former Flaring Pad
2. Former Waste Pile
3. Former Hazardous Waste Storage Areas – Styron Plant

Solid Waste Management Units (Continued)

4. Former Hazardous Waste Storage Area ✓
5. Hazardous Waste Storage Area ✓
6. Hazardous Waste Container Loading Area ✓
7. Former Road Side Staging Area ✓
8. -1 Former Waste Fuel Storage Tanks ✓
9. Hazardous Waste Fuel Storage Tank ✓
10. -2 Process Boilers R1 and R3 ✓
11. Satellite Accumulation Area – Ethafoam Plant
12. Former Methylene Chloride Cleaning Tank ✓
13. Outdoor Off-Specification Product Storage Area
14. Indoor Off-Specification Product Storage Area
15. Two-Section Septic Tank System
16. Solid Waste Dumpsters
17. Storm Water Drainage System
18. Drainage Ditch to Big Thief Creek
19. Drainage Ditch to North
20. Pellet Car Washing Area and Sump
21. Forklift Washing Area and Sump
22. Evaporative Cooling Tower – Styron Plant
23. Former Evaporative Cooling Towers – Ethafoam Plant
24. Process Sewer System
- 25-28. Former Wastewater Treatment System
29. Former Used Filter Sand Pile
30. Former Well Water Treatment Backflush Sump
31. Former Fire Pond
32. Former Aerated Skimmer Basin
33. Dowtherm Satellite Accumulation Areas
34. Dike and Sump System for Runoff and Spill Collection
35. Recycle Styrofoam Cooling Bath
36. Former 250-Gallon Pressurized Storage Tanks
37. Fire Protection Collection Basin
- 38-40. Wastewater Treatment System

Four SWMUs, including the Satellite Accumulation Area – Ethafoam Plant (SWMU 11), the Storm Water Drainage System (SWMU 17), the Drainage Ditch to Big Thief Creek (SWMU 18), the Former Used Filter Sand Pile (SWMU 29), and the Former 250-Gallon Pressurized Storage Tanks (SWMU 36), were identified during the VSI as potential sources of soil contamination. Tetra Tech identified cracks and staining on the concrete pad in the Satellite Accumulation Area – Ethafoam Plant (SWMU 11). Tetra Tech recommends filling the cracks in the pad to reduce the potential for release to on-site soils. In addition, some of the ditches in the Storm Water Drainage System (SWMU 17) are unlined, and storm water flowing through the ditches could contain hazardous constituents. Tetra Tech recommends

collecting soil samples from the unlined portions of the ditches to determine if soil has been impacted. The ditches should also be lined with concrete to reduce the potential for release to on-site soil. Tetra Tech recommends collecting soil samples from the Drainage Ditch to Big Thief Creek (SWMU 18) to determine if past releases from the Former Aerated Skimmer Basin (SWMU 32) have impacted the drainage ditch. Tetra Tech also recommends collecting soil samples in the vicinity of the Former Used Filter Sand Pile (SWMU 29) because there is no documentation regarding closure of this unit and filter sand was stored on the ground. The filter sand was used to filter process water and may have contained hazardous constituents. Finally, Tetra Tech recommends removing and properly disposing of the contents of the two Former 250-Gallon Pressurized Storage Tanks (SWMU 36). During the VSI, the tanks contained solid polymerized styrene. Facility representatives did not know how long the tanks had stored this material.

The potential for facility activities at all other SWMUs to impact on-site soil is low. All units either have adequate release controls, no history of documented releases, stored nonhazardous materials, or are no longer active. The potential for facility activities at all SWMUs to impact groundwater is low because the facility is underlain by a clay layer that may retard flow into the sand and gravel aquifer below the clay layer. The majority of the population in Ironton, Ohio, obtains drinking water from a municipal wellfield located about 33 miles upstream of the facility in the Ohio River flood plain.

Currently, all SWMUs have a low potential for release to nearby surface water bodies because process and septic water and storm water runoff from the facility are treated in the Wastewater Treatment System (SWMUs 38-40) before discharge to the Drainage Ditch to Big Thief Creek (SWMU 18), which eventually flows into the Ohio River. The facility also has four National Pollutant Discharge Elimination System (NPDES) permitted outfalls to the drainage ditch and Big Thief Creek and slide gate valves to contain spills and untreated releases to SWMU 18.

Releases of hazardous constituents to the air are likely because most production areas are located outdoors in covered areas. However, the facility's emissions are regulated under Dow's six environmental air permits.

During a PA/VSI conducted in 1989, five AOCs were identified and include the following:

1. Styrene Spill Near Pump for Styrene Storage Tanks
2. Blowing-Agent Spill
3. Process Filter Area
4. Underground Catalyst Storage Tank
5. Anecdotal Release Information

Since 1989, Dow has addressed issues related to the AOCs with the exception of AOC 5. Tetra Tech did not identify any additional information regarding AOC 5 from background files or during the PA/VSI regarding AOCs.

The facility is monitored 24 hours a day by security personnel and is surrounded by an 8-foot-high chain-link fence with an operating gate and camera surveillance. The surrounding population is sparse, and most nearby land is used for farming.

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech), received Work Assignment No. R05805, Amendment No. 2, from the U.S. Environmental Protection Agency (EPA) under Contract No. 68-W9-9018 to conduct preliminary assessments (PA) and visual site inspections (VSI) of hazardous waste treatment and storage facilities in Region 5.

As part of the EPA Region 5 Environmental Priorities Initiative, the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) programs are working together to identify and address RCRA facilities that have a high priority for corrective action using applicable RCRA and CERCLA authorities. The PA/VSI is the first step in the process of prioritizing facilities for corrective action. Through the PA/VSI process, enough information is obtained to characterize a facility's actual or potential releases to the environment from solid waste management units (SWMU) and areas of concern (AOC).

A SWMU is defined as any discernible unit at a RCRA facility in which solid wastes have been placed and from which hazardous constituents might migrate, regardless of whether the unit was intended to manage solid or hazardous waste.

The SWMU definition includes the following:

- RCRA-regulated units, such as container storage areas, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, and underground injection wells
- Closed and abandoned units
- Recycling units, wastewater treatment units, and other units that EPA has usually exempted from standards applicable to hazardous waste management units
- Areas contaminated by routine and systematic releases of wastes or hazardous constituents. Such areas might include a wood preservative drippage area, a loading or unloading area, or an area where solvent used to wash large parts has continually dripped onto soils.

An AOC is defined as any area where a release of hazardous waste or constituents to the environment has occurred or is suspected to have occurred on a nonroutine and nonsystematic basis. This includes any area where a strong possibility exists that such a release might occur in the future.

The purpose of the PA is as follows:

- Identify SWMUs and AOCs at the facility
- Obtain information on the operational history of the facility
- Obtain information on releases from any units at the facility
- Identify data gaps and other informational needs to be filled during the VSI

The PA generally includes review of all relevant documents and files located at state offices and at the EPA Region 5 office in Chicago.

The purpose of the VSI is as follows:

- Identify SWMUs and AOCs not discovered during the PA
- Identify releases not discovered during the PA
- Provide a specific description of the environmental setting
- Provide information on release pathways and the potential for releases to each medium
- Confirm information obtained during the PA regarding operations, SWMUs, AOCs, and releases

The VSI includes interviewing appropriate facility staff; inspecting the entire facility to identify all SWMUs and AOCs; photographing all visible SWMUs; identifying evidence of releases; making a preliminary selection of potential sampling parameters and locations, if needed; and obtaining additional information necessary to complete the PA/VSI report.

This report documents the results of a PA/VSI of the Dow Chemical Company Hanging Rock Plant (Dow) facility (EPA Identification No. OHD 039 128 913) in Ironton, Ohio. The PA was completed on

April 24, 2000. Tetra Tech gathered and reviewed information from the Ohio Environmental Protection Agency (OEPA) and from EPA Region 5 RCRA files. Tetra Tech also obtained information from the Ohio Department of Natural Resources (ODNR) and the U.S. Geological Survey (USGS) to prepare this PA/VSI report. The VSI was conducted on May 4 and 5, 2000. It included interviews with facility representatives and a walk-through inspection of the facility. Tetra Tech identified 40 SWMUs and no AOCs at the facility.

The VSI is summarized and 21 inspection photographs are included in Appendix A. Photographs for all SWMUs are not included either because the areas contained proprietary Dow equipment or because health and safety concerns prevented the use of a camera in highly volatile areas. Field notes from the VSI are included in Appendix B.

2.0 FACILITY DESCRIPTION

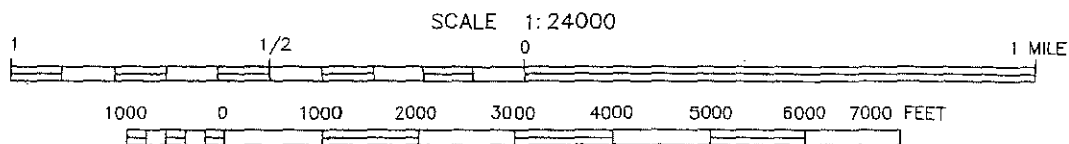
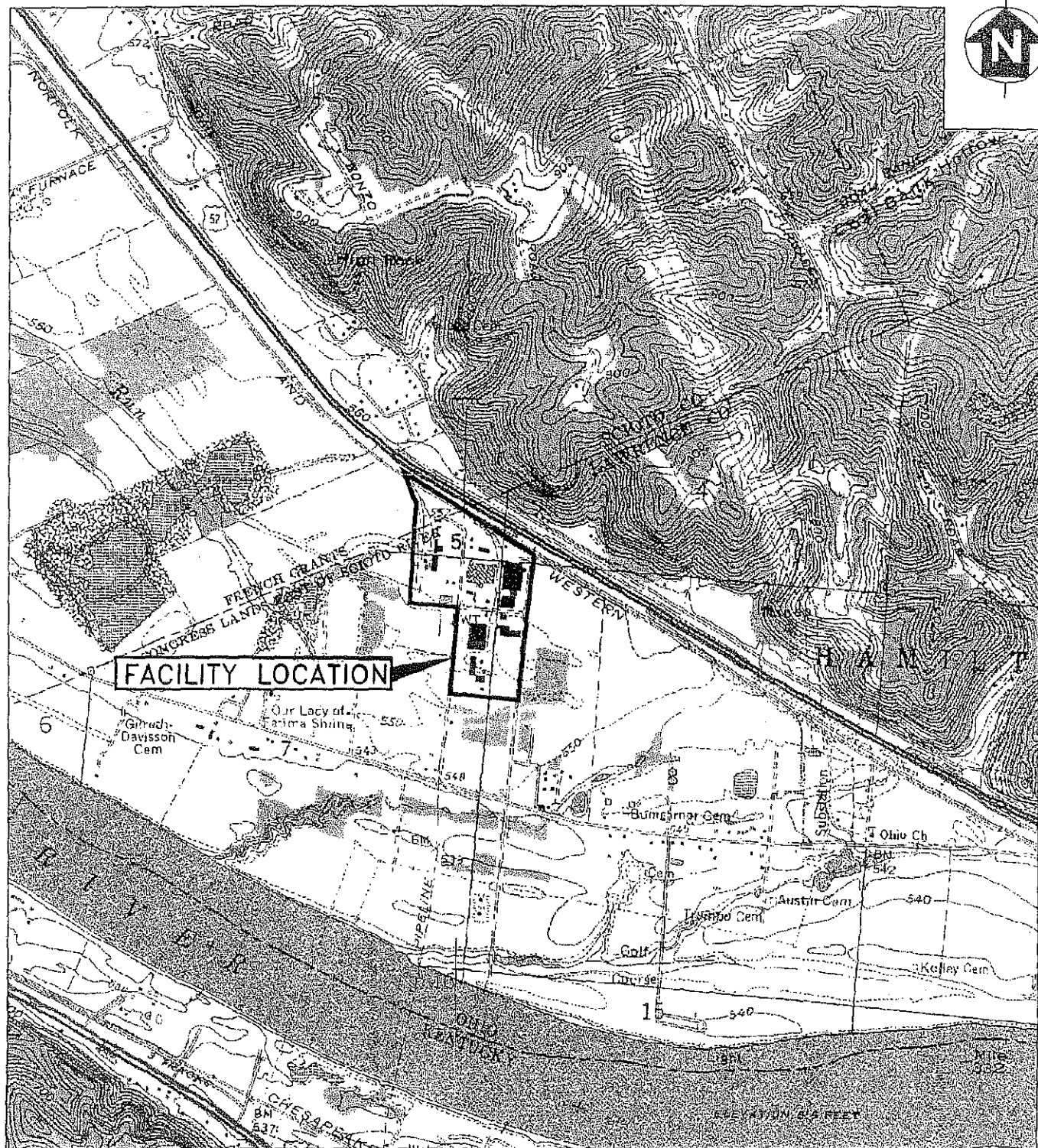
This section describes the facility's location, past and present operations, waste generating processes and waste management practices, history of documented releases, regulatory history, environmental setting, and receptors.

2.1 FACILITY LOCATION

The Dow facility is located in southeastern Ohio about 4 miles northwest of Ironton, Lawrence County, Ohio, between the old and new State Highway 52. The facility occupies only a small portion of Dow's 750-acre plot. The property owned by Dow is bordered on the north by wooded hills beyond new State Highway 52; on the west by farmland, a shrine, an abandoned turkey farm, and a water-filled gravel pit; on the south by the Ohio River; and on the east by farmland. Big Thief Creek flows east to west through the southern portion of Dow's property and discharges into the Ohio River about 1,000 feet south of the property boundary. Figure 1 shows the location of the facility in relation to surrounding topographic features.

2.2 FACILITY OPERATIONS

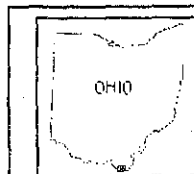
Dow began operating at the facility in 1957 and employs about 100 people. Past land uses, owners, and operators are unknown. There are 12 main buildings on site that are used for manufacturing operations, warehouse space, and office space. There are also a number of site access streets identified as A through E and Fifth, Sixth, and Seventh Streets. The Dow plant currently manufactures and ships polymeric beads and foams, most of which are intermediate products used or combined with other raw materials off site by other companies to manufacture finished products. Three plants currently operate at the Dow facility, including the Styron plant, the Styrofoam plant, and the Ethafoam plant. The Styron plant, which began operating in 1968, produces bulk quantities of high impact polystyrene (HIP) using the trade name Styron™, acrylonitrile butadiene styrene (ABS) co-polymer using the trade name Magnum™, and general purpose polystyrene (GPP). The Styron plant produces 1/8 to 1/4 -inch-diameter beads that are shipped off site by railcar (Radian 1998).



LEGEND

- Primary Highway
- Light-Duty Road
- Unimproved Road
- Railroad

SCALE: 1" = 2,000'



Quadrangle Location

DOW CHEMICAL COMPANY HANGING ROCK PLANT
IRONTON, OHIO

FIGURE 1
FACILITY LOCATION

Tetra Tech EM Inc.

SOURCE: MODIFIED FROM USGS,
GREENUP, KENTUCKY, QUADRANGLE, 1984

The Styrofoam plant, which began operating in 1957, produces polystyrene foam using the trade name Styrofoam™, which is primarily used by the construction industry. This product is shipped by railcar or truck, typically in 3,000-pound shrink-wrapped units. The products range from 1/8 to 3 inches in thickness, and have various lengths and widths (EPA 1989; Radian 1998).

The Ethafoam plant produces polyethylene foam using the trade name Ethafoam™. Ethafoam is a cushioning material with some elastic properties. It requires further off-site processing to protect computers or other shock-sensitive products during shipping. Because of the end-use of the product, it must be protected from dirt and sun and is typically shipped in closed semitrailer trucks or closed railcars. An example of a Ethafoam product is Seal Sil™, which comes in 50-foot-long, 6-inch-wide rolls of foam used to seal house foundations (EPA 1989; Radian 1998).

The raw materials used to produce plant products include liquid styrene, ethylbenzene, acrylonitrile, polyethylene, various catalysts and blowing agents, and butadiene rubber. General processes for Ethafoam and Styrofoam include extrusion, cooling, foaming, cutting, and cooling. The general processes for the Styron plant include catalytic polymerization of polystyrene, HTP, and ABS co-polymer (EPA 1989).

Solid wastes generated from facility operations and the SWMUs where they are managed are discussed in detail in Section 2.3.

2.3 WASTE GENERATION AND MANAGEMENT

This section describes waste generation and management at the Dow facility. The facility's SWMUs are identified in Table 1. The facility layout, including SWMUs, is shown in Figure 2. The facility's waste streams are summarized in Table 2.

The Dow facility is considered a large-quantity generator of hazardous waste. Some of the wastes produced at the facility are considered hazardous; others contain only small amounts of hazardous constituents. Most hazardous wastes are generated by the Styron plant as a result of (1) cross-contamination of product and heat transfer fluids (Dowtherm), (2) process sampling, (3) residuals from process upsets and cleaning, and (4) condensate collection from the process byproduct stream. Available

TABLE 1

SOLID WASTE MANAGEMENT UNITS

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit ^a	Status
1	Former Flaring Pad	No	Inactive: 1968
2	Former Waste Pile	No	Inactive: 1965
3	Former Hazardous Waste Storage Areas - Styron Plant	No	Inactive: 1980
4	Former Hazardous Waste Storage Area	Yes	Inactive: 1980 or 1982
5	Hazardous Waste Storage Area	Yes	Active (less than 90-day storage)
6	Hazardous Waste Container Loading Area	No	Active
7	Former Road Side Staging Area	No	Inactive: 1987
8	Former Waste Fuel Storage Tanks	Yes	Inactive: 1990
9	Hazardous Waste Fuel Storage Tank	Yes	Active
10	Process Boilers R1 and R3	Yes	Active
11	Satellite Accumulation Area - Ethafoam Plant	No	Active
12	Former Methylene Chloride Cleaning Tank	No	Inactive: 1993
13	Outdoor Off-Specification Product Storage Area	No	Active
14	Indoor Off-Specification Product Storage Area	No	Active
15	Two-Section Septic Tank System	No	Active
16	Solid Waste Dumpsters	No	Active
17	Storm Water Drainage System	No	Active
18	Drainage Ditch to Big Thief Creek	No	Active
19	Drainage Ditch to North	No	Active

TABLE 1 (Continued)

SOLID WASTE MANAGEMENT UNITS

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit ^a	Status
20	Pellet Car Washing Area and Sump	No	Active
21	Forklift Washing Area and Sump	No	Active
22	Evaporative Cooling Tower – Styron Plant	No	Active
23	Former Evaporative Cooling Towers – Ethafoam Plant	No	Inactive: 1992
24	Process Sewer System	No	Active
25-28	Former Wastewater Treatment System	No	Inactive: 1992
29	Former Used Filter Sand Pile	No	Inactive: 1992
30	Former Well Water Treatment Backflush Sump	No	Inactive: 1992
31	Former Fire Pond	No	Inactive: 1996
32	Former Aerated Skimmer Basin	No	Inactive: 1992
33	Dowtherm Satellite Accumulation Areas	No	Active
34	Dike and Sump System for Runoff and Spill Collection	No	Active
35	Recycle Styrofoam Cooling Bath	No	Active
36	Former 250-Gallon Pressurized Storage Tanks	No	Inactive: 1995
37	Fire Protection Collection Basin	No	Active

TABLE 1 (Continued)

SOLID WASTE MANAGEMENT UNITS

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit ^a	Status
38-40	Wastewater Treatment System	No	Active

Note:

- ^a A RCRA hazardous waste management unit is one that requires or formerly required submittal of a RCRA Part A or Part B permit application.



STATE HIGHWAY 52

NORFOLK AND WESTERN RAILROAD

A Street

B Street

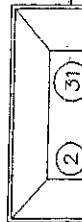
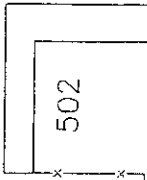
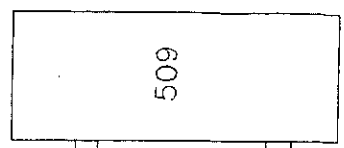
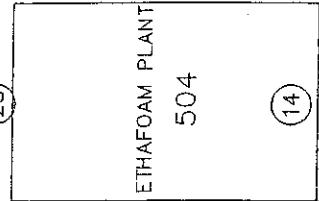
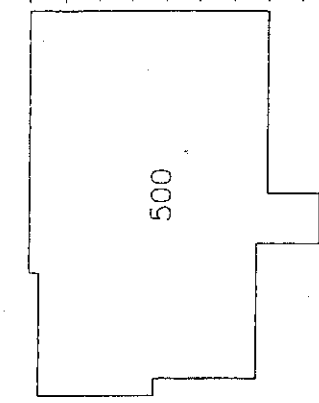
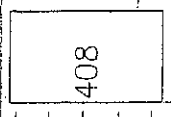
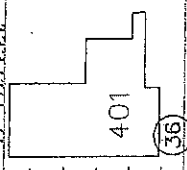
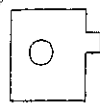
C Street

D Street

Fourth Street

STYRON PLANT

ETHAFOAM PLANT



505 (21)

9

10

22

6

14

13

19

12

406

36

20

407

408

8

5

4

7

24

37

36-40

26-28

31

30

409

ETHAFOAM PLANT

504

500

502

507

406

401

408

409

31

30

409

ETHAFOAM PLANT

504

500

502

507

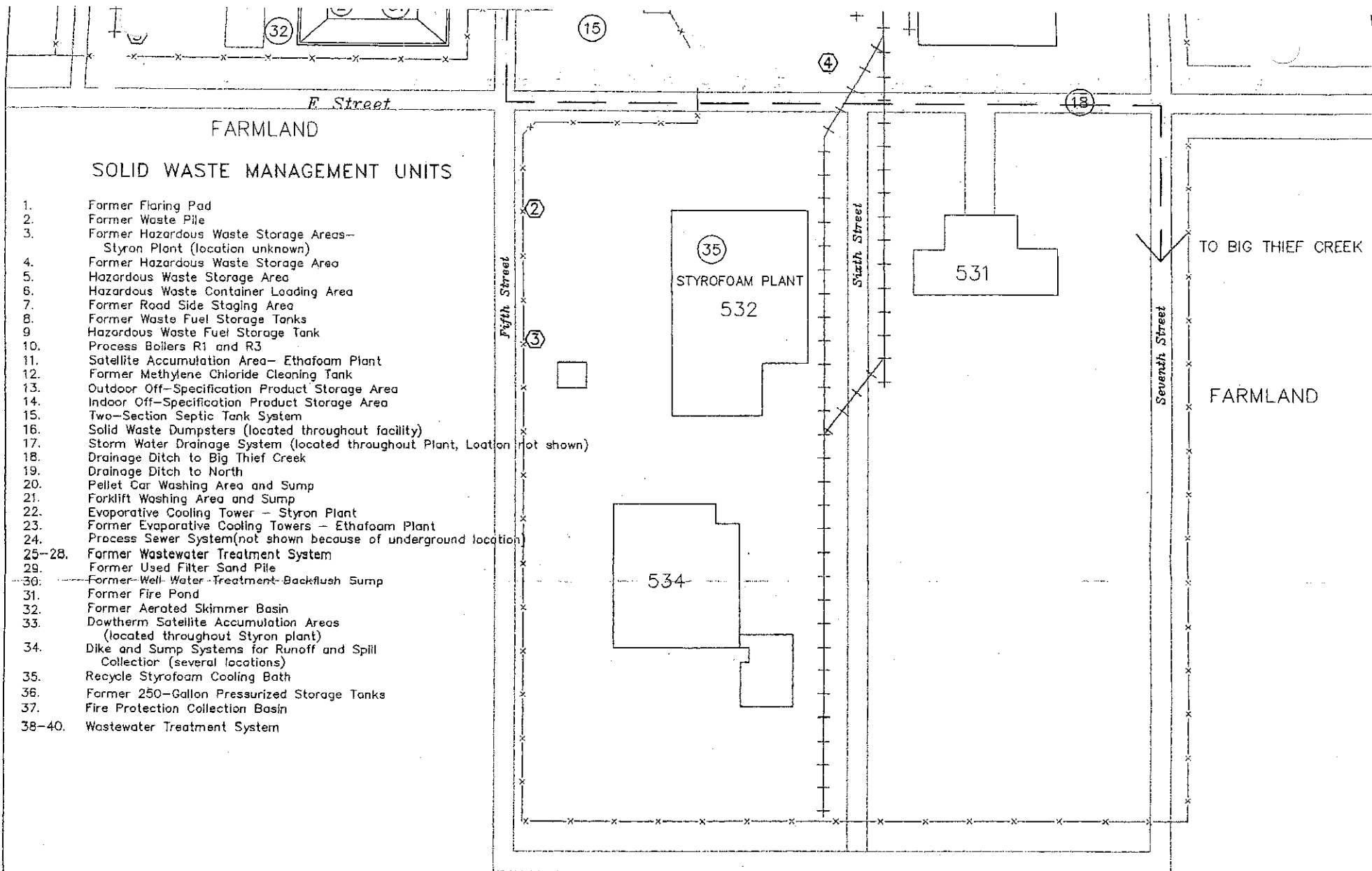


TABLE 2
SOLID WASTES

Waste/EPA Waste Code ^a	Source	Solid Waste Management Unit
Partially polymerized wastes, waste oil, liquid byproduct (hazardous waste fuel) (D001 and D018)	Styrofoam, Styron, and Ethafoam plant processes	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 36
Laboratory wastes (D001 and D018)	On-site laboratory tests	4, 5, 6
Contaminated gloves, boots, rags, process feed filters, and dirt mixtures (D001, D018)	Maintenance cleaning	2, 4, 5, 6, 7, 11
Dowtherm fluid (NA)	Bleeding, sampling, and process upsets in Styron plant	4, 5, 6, 11, 33
Liquid wastes (D001 and D018)	Ethafoam and Styron plant processes	3, 4, 5, 6, 7, 8, 9, 10, 36
Scrap waste paper, wood, foam, and general housekeeping wastes (NA)	Styrofoam, Ethafoam, and Styron plant processes	2, 16
Off-specification products (NA)	Styrofoam, Ethafoam, and Styron plant processes	13, 14
Wastewaters including process and septic water and storm water runoff (D001 and D018)	Styrofoam, Ethafoam, and Styron plant processes, various plant sumps, and plant property runoff	15, 17, 18, 19, 20, 21, 22, 23, 24, 25-28, 30, 31, 32, 34, 35, 37, 38-40
Backflush (NA)	Former well water treatment system	18, 30, 31
Used filter sand (D001 and D018)	Formerly used tertiary sand filters	29
Methylene chloride waste (F002)	Former equipment cleaning operation	4, 5, 12

Note:

^a Not applicable (NA) designates nonhazardous waste.

file information indicates a reluctance on Dow's part to classify the condensate as hazardous waste, and Dow prefers to use the term "process byproduct stream." However, Dow has agreed to treat the condensate as a hazardous waste as required by OEPA.

Most of the waste generated in the three Dow plants are characteristic hazardous wastes (D001 and D018). The solid D001 and D018 wastes are temporarily stored in 55-gallon drums at satellite accumulation areas or transferred directly to the Hazardous Waste Storage Area (SWMU 5). The wastes include partially polymerized styrene, ethylbenzene, polystyrene, rubber, and acrylonitrile wastes; various laboratory wastes; solvent contaminated gloves, boots, rags, process feed filters; and styrene/ethylbenzene/Dowtherm/dirt mixtures. These wastes are currently or were formerly managed at the following SWMUs: Former Road Side Staging Area (SWMU 7), Former Waste Fuel Storage Tanks (SWMU 8), Hazardous Waste Fuel Storage Tank (SWMU 9), Process Boilers R1 and R3 (SWMU 10), and the Former 250-Gallon Pressurized Storage Tanks (SWMU 36). The drums are stored in the Hazardous Waste Storage Area (SWMU 5) for less than 90 days (EPA 1989). The partially polymerized wastes, laboratory wastes, and contaminated gloves, boots, rags, feed filters, and dirt mixtures are then transferred to the Hazardous Waste Container Loading Area (SWMU 6) before being transported to the Green Valley Landfill in Smithfield, Kentucky, for disposal.

A significant number of Dowtherm Satellite Accumulation Areas (SWMU 33) were observed throughout the Styron plant during the VSI. According to the facility representative, Dowtherm is a proprietary heat transfer fluid; therefore, Dow could not divulge the constituents of Dowtherm, but Dow claims that Dowtherm does not contain polychlorinated biphenyls (PCB). Bleeding, sampling, and process upsets produce waste Dowtherm throughout the Styron plant, which is stored in 55-gallon drums. Some of the Dowtherm is reused directly, and some is shipped to a reclaimer to be reprocessed (EPA 1989). The amount shipped off site to be reprocessed is unknown.

The liquid D001 and D018 wastes consist of styrene, ethylbenzene, acrylonitrile, Dowtherm water, or oil solutions and solvent-contaminated lubricating oils. These wastes are generated by the Ethafoam and Styrofoam plant processes and are stored in 55-gallon drums. These drums are also stored in the Hazardous Waste Storage Area (SWMU 5). The liquid waste drums are eventually transported to Safety Kleen in Bridgeport, New Jersey, for incineration. About 1,406,000 pounds of D001 and D018 waste were generated by Dow in 1999.

A liquid byproduct (hazardous waste fuel) consisting of styrene, ethylbenzene, and acrylonitrile (D001 and D018) originates from condensate collection. The liquid byproduct is accumulated in a 10,000-gallon Hazardous Waste Fuel Storage Tank (SWMU 9) and used as fuel in Process Boilers R1 and R3 (SWMU 10). About 1,069,223 gallons of D001 and D018 by-product fuel was burned in 1999. Because the SWMU 9 tank is currently operated as a less than 90-day accumulation tank, some of the waste is drummed and shipped to Safety Kleen in Bridgeport, New Jersey, for incineration.

Several nonhazardous wastes that may contain hazardous constituents are also generated at the Dow facility. These wastes include scrap waste paper, wood, foam, and general housekeeping wastes in Solid Waste Dumpsters (SWMU 16) and off-specification products in the Indoor Off-Specification Product Storage Area (SWMU 14) and the Outdoor Off-Specification Product Storage Area (SWMU 13) (EPA 1989).

Wastewaters generated from various plant processes are or were managed at the following SWMUs: Two-Section Septic Tank System (SWMU 15), Former Evaporative Cooling Towers in the Ethafoam Plant (SWMU 23), the Process Sewer System (SWMU 24), the Former Wastewater Treatment System (SWMUs 25-28), the Former Well Water Treatment Backflush Sump (SWMU 30), the Former Fire Pond (SWMU 31), and the Former Aerated Skimmer Basin (SWMU 32). The wastewaters and storm water runoff from the Storm Water Drainage System (SWMU 17) and the Dike and Sump System for Runoff and Spill Collection (SWMU 34) are treated on site by the Wastewater Treatment System (SWMUs 38-40) installed in 1992. The system can treat up to 24 gallons per minute (gpm). The system consists of an Aerator System (SWMU 38), a Clarifier (SWMU 39), and a Tertiary Sand Filter System (SWMU 40). A Fire Protection Collection Basin (SWMU 37) is used as a receiving tank prior to the pumping of the wastewater and storm water runoff to the headworks of the Wastewater Treatment System (SWMUs 38-40).

Wastewaters include washwater from the Forklift Washing Area and Sump (SWMU 21); washwater from the Pellet Car Washing Area and Sump (SWMU 20); boiler blowdown from both steam and Process Boilers R1 and R3 (SWMU 10); bleed from contact cooling water bath and cooling tower in the Evaporative Cooling Tower-Styron Plant (SWMU 22) and Recycle Styrofoam Cooling Bath (SWMU 35); and septic water. Most treated or untreated storm water runoff and all treated wastewater is discharged into the Drainage Ditch to Big Thief Creek (SWMU 18). Big Thief Creek discharges into the

Ohio River. Some storm water runoff discharges towards the northwest into the shallow Drainage Ditch to North (SWMU 19). This ditch flows into Gervais Run Creek, which discharges into the Ohio River about 2.25 miles west of the Dow facility.

In addition to present waste generation and management practices, former waste activities were also identified at the Dow facility. From 1957 to 1965, the solid industrial wastes including scrap paper and wood and contaminated gloves, boots, and process cartridge filters were burned in the on-site Former Waste Pile (SWMU 2). The residuals were periodically picked up with a bulldozer, loaded onto trucks, and transported to a local landfill for disposal (EPA 1989).

From 1957 to 1968, hazardous liquid byproduct (styrene and ethylbenzene) was burned in 55-gallon drums on the Former Flaring Pad (SWMU 1) using an aspirated system (EPA 1989).

From 1957 to 1976, wastewater was routed to a Two-Section Septic Tank System (SWMU 15) before being discharged to the Drainage Ditch to Big Thief Creek (SWMU 18) (EPA 1989).

From 1974 to 1978, hazardous partially polymerized and liquid D001 and D018 wastes were stored in 55-gallon drums at various Former Hazardous Waste Storage Areas – Styron Plant (SWMU 3). The exact locations of the storage areas is unknown. Available file information indicates that about 1,000 55-gallon drums were generated during this period. The drums were moved to a Former Hazardous Waste Storage Area (SWMU 4) and eventually shipped to Dow's Midland, Michigan, facility for incineration (EPA 1989).

From 1979 to 1980, the Former Hazardous Storage Area (SWMU 4) was used to store 55-gallon drums of the D001 and D018 wastes generated in the polystyrene production area. File materials state that the unit closed in 1980, but it is likely that it operated until 1982, when the current Hazardous Waste Storage Area (SWMU 5) went into operation.

From 1979 to 1986, two 12,000-gallon aboveground Former Waste Fuel Storage Tanks (SWMU 8) were used to store liquid byproduct waste to be used as fuel. Because the tank nozzles became plugged with rubber precipitating out of solution, the contents of the tanks were pumped into trucks and taken to Dow's Midland, Michigan, facility for incineration (EPA 1989).

From February 1987 to June 1987, the number of 14-gallon containers of hazardous waste in the Hazardous Waste Storage Area (SWMU 5) exceeded the storage capacity; therefore, the containerized wastes were temporarily stored along the road in a Former Road Side Staging Area (SWMU 7) near the Hazardous Waste Storage Area (SWMU 5). Dow representatives stated that wastes were not stored for more than 90 days at this roadside location (EPA 1989).

The 1989 VSI report notes that about 20 Former 250-Gallon Pressurized Storage Tanks (SWMU 36) were located throughout the facility. The tanks were reportedly used to store liquid D001 and D018 wastes, specifically waste oil contaminated with styrene from a process line in the Styron plant. According to facility representatives, the tanks are no longer used to store waste oil. Their dates of operation are unknown.

A Former Well Water Treatment Backflush Sump (SWMU 30) operated at the facility until 1992. The date of startup for the sump is unknown. The sump received backflush from the well water treatment system. The backflush reportedly contained filter sand and salt and was not treated prior to discharge to the Former Fire Pond (SWMU 31), which overflowed into the Drainage Ditch to Big Thief Creek (SWMU 18).

From 1962 to 1992, two Former Evaporative Cooling Towers – Ethafoam Plant (SWMU 23) cooled noncontact cooling water from the Ethafoam plant and contact cooling water from the Ethafoam recycling operation. The contact cooling water reportedly contained constituents such as catalysts and blowing agents.

From 1976 to 1992, wastewater was routed to a Former Aerated Skimmer Basin (SWMU 32) and the Former Wastewater Treatment System (SWMUs 25-28), where it was skimmed, aerated, filtered, and chlorinated before discharge to the Former Fire Pond (SWMU 31), which overflowed into the Drainage Ditch to Big Thief Creek (SWMU 18). The Former Used Filter Sand Pile (SWMU 29), which was used to temporarily store filter sand from the Former Tertiary Sand Filters, stopped operating when the new Wastewater Treatment System (SWMUs 38-40) was installed in 1992.

From 1983 to 1993, methylene chloride was used to clean process equipment in the Former Methylene Chloride Cleaning Tank (SWMU 12). According to Dow representatives, methylene chloride was

received in bulk form, used within 5 to 7 days, and sent to Chemical Solvents, Inc., for reclamation in bulk form. Any excess methylene chloride remaining in the tank was placed in 55-gallon drums and stored temporarily in the Hazardous Waste Storage Area (SWMU 5).

2.4 HISTORY OF DOCUMENTED RELEASES

This section discusses the history of documented releases to groundwater, surface water, air, and on-site soil at the facility. Tetra Tech identified the releases discussed below at the facility since it began operations. Tetra Tech was unable to obtain detailed information regarding these releases.

On December 13, 1985, Dow submitted a "Certification Regarding Potential Releases from Solid Waste Management Units" to EPA indicating that a release of styrene, ethylbenzene, and partially polymerized polystyrene had occurred in the Former Hazardous Waste Storage Area (SWMU 4), between 1978 and 1980. About 50 gallons of this material was released. Contaminated soil was removed and transported to Dow's Midland, Michigan, facility for incineration. The liquid waste was pumped into a tanker truck and transported to the City of Cincinnati's Metropolitan Sewer District for incineration (Dow 1985).

On June 8, 1987, two 14-gallon plastic drums on the bottom row of a pallet of drums in the unit collapsed. Waste poured from one of the drums, and a pool of liquid accumulated on the storage area floor. Dow responded by cleaning up the area the same day. The recovered waste was transported to Dow's Midland, Michigan, incinerator on July 1, 1987 (EPA 1989).

In 1987, a small fire occurred near Process Boilers R1, R2, and R3 that was reportedly related to a Dowtherm spill in one of the satellite accumulation areas (EPA 1989).

On January 13, 1988, a styrene monomer spill occurred in the diked pump area near two styrene storage tanks. The seal on the pump broke, and styrene filled the diked area and seeped into the Drainage Ditch to Big Thief Creek (SWMU 18). Contaminated soil from the diked area was removed, placed in 55-gallon drums, and sent to Dow's Midland, Michigan, facility for incineration. The area was then backfilled with clean fill (EPA 1989). In addition, in 1989, a release of untreated process water from the Former Aerated Skimmer Basin (SWMU 32) to the surface water in the Drainage Ditch to Big Thief Creek (SWMU 18) occurred. The pump in the basin was too small to offset an increase in the amount of

process water from the Process Sewer System (SWMU 24). The estimated rate of discharge was about 1 gpm. The water was reportedly very oily and emitted a strong organic odor (EPA 1989).

On August 16, 1988, a blowing agent spill occurred in the Styrofoam plant. Available file information indicates that the blowing agent, ethyl chloride, vaporized almost immediately. The plant was shut down, and the northern part of the facility was evacuated during cleanup. Air concentrations reportedly exceeded 100 parts per million. The amount of blowing agent spilled is unknown (EPA 1989).

A 1993 subsurface investigation conducted by Dow's contractor, Radian, revealed the presence of ethylbenzene, styrene, and traces of acrylonitrile in subsurface soil along the segment of the unit sewer line underlying the Former Hazardous Waste Storage Area (SWMU 4). Data showed that the unit was contributing to the constituents detected in the subsurface soil. As a result, a 235-foot-long section of the process sewer line and contaminated soil were removed and replaced in 1997 (Radian 1998).

A document titled "RCRA Part B Permit Application for BIF Units" refers to a 7,900-pound spill that reportedly occurred at the Hazardous Waste Fuel Storage Tank (SWMU 9) in 1997 (ENSR 1999). No additional information is available regarding this spill. However, facility representatives state that no release has occurred from this SWMU and that the spill was mistakenly reported.

2.5 REGULATORY HISTORY

In November 1980, Dow filed a RCRA Part A permit application to EPA for a hazardous waste storage area with a capacity of 15,000 gallons (Dow 1980). In November 1981, OEPA issued Dow an Ohio Hazardous Waste Facility Installation and Operation Permit based on information in the Part A permit application. In May 1982, EPA approved Part A interim status authorizing Dow to store 15,000 gallons of hazardous wastes in the on-site hazardous waste storage area, which is SWMU 4, the Former Hazardous Waste Storage Area. In April 1983, the Part A permit was revised to remove methylene chloride from the list of hazardous wastes stored at the facility (EPA 1989).

In January 1986, Dow submitted a Notification of Hazardous Waste Activity to revise its Part A and Part B permit applications and the Ohio Hazardous Waste Installation and Operation Permit. The revision concerned the addition of a 14,000-gallon storage tank for D001 fuel. In January 1987, OEPA

submitted a letter to Dow stating that the addition of the 14,000-gallon storage tank for D001 fuel was classified as a "modification" by OEPA (EPA 1989).

In April 1988, OEPA submitted a letter to Dow stating that the 14,000-gallon D001 fuel storage tank had to be operated on a less than 90-day waste accumulation basis until the Part B permit application was approved by OEPA and the Hazardous Waste Facility Board has issued the final permit (EPA 1989).

From May 1982 through February 1988, OEPA conducted several interim status inspections at the facility. Available file information indicates that all deficiencies and points of noncompliance noted by OEPA were remedied by Dow, and no fines were assessed (EPA 1989).

In March 1989, DPRA, Inc., on behalf of EPA Region 5 conducted a VSI at the Dow facility. The VSI identified 37 active SWMUs, six inactive SWMUs, and five AOCs (EPA 1989).

A July 26, 1989, inspection by OEPA revealed that the original hazardous waste storage area (SWMU 4) had been replaced by a storage area located about 50 feet away. This area is SWMU 5, the Hazardous Waste Storage Area. The new hazardous waste storage area was being used without proper permits and approvals (OEPA 1989). Other violations noted during the inspection included mislabeled hazardous wastes, housekeeping problems, and inadequate operational and training records. In 1990, Dow submitted a closure plan for the abandoned hazardous waste storage area. OEPA noted several deficiencies in the closure plan. The closure plan was subsequently amended and approved by OEPA in April 1991 (OEPA 1990a; 1990b; 1991; 1993).

On October 1, 1990, Dow submitted a request for a wastewater permit to install a new On-Site Wastewater Treatment System (SWMUs 38-40). The system was completed on August 26, 1992, under OEPA-approved Permit to Install No. 06-2929 (Dow 1992a).

In September 1992, OEPA conducted a compliance evaluation inspection (CEI) at the Dow facility. This inspection revealed that the facility failed to comply with regard to the following: accumulation time of hazardous wastes, personnel training, content of contingency plan, emergency procedures, facility operation and maintenance, purpose and implementation of contingency plan, testing and maintenance of equipment, adequate aisle space, inspections, and container conditions (OEPA 1992). Dow took steps to remedy these problems (Dow 1992b).

In April 1994, OEPA conducted a boiler and industrial furnace (BIF) inspection at the facility and reported violations including the following: improper vent gas analysis, monitoring of vapor feed rate, and waste flow monitoring; exceeding the hazardous feed rate; and lack of a record of prior feed rates (OEPA 1994a). In September 1994, OEPA issued a RCRA formal enforcement action against Dow regarding hazardous waste burned in the facility BIFs (OEPA 1994a; 1994b; 1994c).

In April 1996, Dow submitted a closure plan to OEPA for SWMU 4 and a section of a process sewer line (Dow 1996a). OEPA approved the closure plan in September 1996. Closure of SWMU 4 was completed and approved by OEPA in December 1996 (OEPA 1997).

In April 1996, Dow submitted a closure plan for the Former Fire Pond (SWMU 13) (Dow 1996b). Closure of the fire pond was completed on January 21, 1997 (Dow 1997).

On December 18, 1996, EPA conducted a BIF inspection of the Dow facility. The results of the inspection indicated that the facility was operating in compliance with RCRA guidelines (EPA 1997).

On September 11, 1998, OEPA sent Dow a letter requesting that Dow submit Part B of its permit application for the facility's boilers (OEPA 1998). Dow's Part B permit application was completed and submitted to OEPA in March 1999 (ENSR 1999).

The facility's current status is a large-quantity generator of hazardous waste.

Dow has a National Pollutant Discharge Elimination System (NPDES) permit (OH0099309) for the following outfalls:

<u>Outfall Number</u>	<u>Receiving Water</u>
001	Big Thief Creek
601	Main Ditch
602	Main Ditch
603	Main Ditch

The NPDES permit allows discharge of treated wastewater from the Wastewater Treatment System (SWMUs 38-40), fire protection test water, and reverse osmosis reject water (EPA 1998). On May 25, 1999, OEPA conducted a CEI inspection at the Dow facility and noted no violations of the terms and conditions of the NPDES discharge permit (OEPA 1999).

The facility has six air permits that cover the Ethafoam plant process boiler, the Styron plant process boiler, an Ethafoam warehouse space heater, two Ethafoam plant space heaters, a Styrofoam plant space heater, and three Dowtherm process heaters.

2.6 ENVIRONMENTAL SETTING

This section describes the climate, flood plain and surface water, geology and soils, and groundwater in the vicinity of the facility.

2.6.1 Climate

The climate in Lawrence County is characterized by cold winters and hot summers, with a yearly average temperature of 55 °F. The lowest average temperature is 25 °F in January and the highest average temperature is 87 °F in July. Precipitation in the Ironton, Ohio, area averages about 41 inches annually. Weather records for this area indicate that March through August are the wettest months, averaging greater than 3.5 inches of precipitation per month, while October, November, and February are the driest months, with less than 3.0 inches of precipitation per month. Average annual snowfall for Ironton is 25.9 inches. The prevailing wind is from the south to south-southeast. Average wind speed is highest in the spring at 6.5 miles per hour (ODNR 1998).

2.6.2 Flood Plain and Surface Water

There are two creeks on and around the Dow property. Big Thief Creek flows east to west across the southern part of Dow's property. Big Thief Creek receives the majority of runoff from the Dow plant. All of the surface drainage south of B Street flows to a drainage ditch, which empties into Big Thief Creek. Gervais Run Creek receives surface drainage from the northwest corner of the facility north of Street B. Big Thief Creek discharges into the Ohio River about 1,000 feet west of the property line.

Gervais Run Creek discharges into the Ohio River about 2.5 miles west of the facility (USGS 1985). The Ohio River supplies water for recreational and municipal purposes. The City of Ironton receives water from the Hecla Water Association (Hecla), which maintains a surface water intake on the Ohio River located about 4 miles upstream of the facility (EPA 1989; Hecla 1992).

The facility is located on a terrace in the Ohio River 100-year flood plain. All of the facility south of D Street, including the Wastewater Treatment System (SWMUs 38-40) and the Hazardous Waste Storage Area (SWMU 5) is located within or on the border of the 100-year flood plain (EPA 1989).

2.6.3 Geology and Soils

The facility is located in the Lexington Plain Section of the Interior Lowland Plateaus Province south of the limit of glacial deposits. The facility is underlain by Pennsylvanian sedimentary units of the Allegheny Formation. This formation consists of alternating cyclothermic sequences of sandstones, coal, shale units, and carbonates (ODNR 1998).

The Dow facility is underlain primarily by a combination of clay, sand and gravel, and a lower shale layer. Information regarding subsurface materials for the Dow facility was obtained from a preliminary hydrological study completed at the Dow site in January 1988. Well logs from five water wells installed on Dow's property, which was part of the study, indicate the following stratigraphy:

- 0 to 4 inches below ground surface (bgs): soil overburden
- 4 inches bgs to 20 feet bgs: clay layer
- 20 to 80 feet bgs: coarse sand and gravel layer

Bedrock shale was encountered below the coarse sand and gravel layer. The shale acts as the lower confining layer for the sand and gravel aquifer (EPA 1989).

Soils in the vicinity of the facility are of the Sciotoville silt loam group. These soils are characterized as gently sloping, moderately well drained, with low to moderate permeability, and used mainly for cropland (ODNR 1998).

2.6.4 Groundwater

Groundwater quality and flow conditions in the underlying sand and gravel aquifer are unknown. The U.S. Geological Survey has no information on this area. Regional well logs indicate that the groundwater table is located about 20 to 25 feet bgs. Based on surface topography, groundwater is assumed to flow southwest. The Ohio River provides most of the recharge to the sand and gravel aquifer. The clay layer underlying the facility may retard surface drainage in the facility area from significantly contributing to the sand and gravel aquifer (EPA 1989; ODNR 1985).

The Hecla supplies most of the residents within the vicinity of the site with water through a rural water supply system. Hecla distribution maps show water service to nearly all residents in the surrounding area. The water is obtained from a wellfield in Rome, Ohio, located about 33 miles upstream from the Dow facility on the Ohio River flood plain. Hecla also maintains a surface water intake on the Ohio River located about 4 miles upstream from the facility (Hecla 1992). Other residential wells may still be in use, but it is uncertain how many residents in the area use private wells. The distance to the nearest residential well is unknown.

2.7 RECEPTORS

The facility is located about 4 miles northwest of Ironton, Ohio, between old and new State Highway 52. The facility is mostly surrounded by farmland. Ironton has a population of about 12,750. Sparse residences are located 2,000 to 3,000 feet south, southeast, and southwest of the facility along old State Highway 52. Larger groups of residences are located about 1,000 feet northwest and 1 mile west of the facility.

The facility is bordered on the north by wooded hills beyond new State Highway 52; on the west by farmland, a shrine, an abandoned turkey farm, and a water-filled gravel pit; on the south by the Ohio River; and on the east by farmland. The nearest school is located about 3.5 miles east of the facility (USGS 1984). The facility is monitored 24 hours per day by security personnel and is surrounded by a 8-foot-high, steel, chain-link fence with an operating gate and camera surveillance.

The nearest surface water body, Big Thief Creek, is located on site and discharges into the Ohio River about 1,000 west of the facility property line. The Ohio river is used for municipal water supply and recreational purposes. Hecla maintains a surface water intake on the Ohio River about 4 miles upstream of the facility (Hecla 1992).

Groundwater is used as a residential and municipal water supply source in Ironton, Ohio. The Hecla municipal wellfield is located about 33 miles southeast (upstream) of the facility in the Ohio River flood plain. The distance to the nearest residential well is unknown. Well logs from a hydrological study conducted at the Dow facility indicate that the underlying sand and gravel aquifer is located at about 20 to 25 feet bgs (EPA 1989).

No wetlands or sensitive environments exist within 2 miles of the facility (U.S. Forest Service 1992; USGS 1984).

3.0 SOLID WASTE MANAGEMENT UNITS

This section describes the 40 SWMUs identified during the PA/VSI. The following information is presented for each SWMU: description of the unit, dates of operation, wastes managed, release controls, history of documented releases, and Tetra Tech's observations. Figure 2 shows the SWMU locations.

SWMU 1

Former Flaring Pad

Unit Description:

This unit consists of a concrete slab, which was located on the site of the present maintenance building (Building 505), used to burn wastes using an aspirated system. Specifically, waste liquids and byproducts from the Styrofoam process containing styrene, partially polymerized polystyrene, and ethylbenzene were burned by slightly pressurizing a 55-gallon drum and flaring the liquid off a nozzle attached to the drum. The pad was smaller than the dimensions of the present maintenance building (125 by 50 feet) and had no curbing. The pad and surrounding soil were removed when the maintenance building was constructed over the site.

Date of Startup:

The unit began operating in 1957.

Date of Closure:

The unit became inactive in 1968, when the slab was removed and the present maintenance building was constructed over it.

Wastes Managed:

Ignitable wastes from the Styrofoam process containing partially polymerized styrene, polystyrene, ethylbenzene and liquid byproduct were burned in this unit.

Release Controls:

The unit's only release control was a concrete pad on which the drums were flared.

History of Documented Releases: No releases were documented from this unit. However, air releases likely occurred because no controls were used for flaring.

Observations: The unit no longer exists. Tetra Tech observed the site of the Former Flaring Pad, which is the site of maintenance Building 505. Tetra Tech did not photograph the former location of this unit.

SWMU 2

Former Waste Pile

Unit Description: This unit consisted of a waste pile measuring about 60 by 60 feet used for the accumulation and subsequent burning of process filters, wood pallets, scrap product, contaminated boots and gloves, waste paper, and other solid wastes. The waste pile was located on bare ground at the site of the Former Fire Pond (SWMU 31). Much of the waste was burned on site. Residual ash was intermittently transported and disposed of in the Hamilton Township Landfill.

Date of Startup: The unit began operating in 1957.

Date of Closure: In 1965, the last residual waste was shipped to Hamilton Township Landfill. The soil and sediment beneath and around the waste pile were completely removed during excavation for the Former Fire Pond (SWMU 31).

Wastes Managed: Based on available file information, only nonhazardous solid waste was managed in this unit. However, during the 1989 VSI, it was reported that some wastes containing hazardous materials (ethylbenzene, styrene, and acrylonitrile) may have been placed in the pile, such as process filters, contaminated gloves, and boots.

Release Controls:	This unit had no release controls other than the natural clay soil underlying the facility.
History of Documented Releases:	No releases were documented from this unit.
Observations:	The unit no longer exists. Tetra Tech observed the site of the Former Waste Pile, which is a grassy area located west of the Wastewater Treatment System (SWMUs 38-40) (see Photograph No. 1).
SWMU 3	Former Hazardous Waste Storage Areas – Styron Plant
Unit Description:	During its operation, an estimated three or four storage areas located throughout the Styron plant were used to temporarily store about 1,000 55-gallon drums of polystyrene wastes. The exact locations of the areas are unknown. In 1974, Dow decided to drum the ignitable wastes generated in the Styron plant and burn them in their Dowtherm boilers rather than pay the high cost of transporting the wastes to Dow's incinerator in Midland, Michigan. These storage areas developed when the quantity of waste generated exceeded the capacity of the Dowtherm boilers to burn the wastes. The drums were brought from the unit to the Former Hazardous Waste Storage Area (SWMU 4) for storage prior to removal for incineration. All of the storage areas were on concrete pads, and the drums were reportedly covered.
Date of Startup:	The storage areas began operating in 1974.
Date of Closure:	All wastes were removed from the storage areas between 1978 and 1980.
Wastes Managed:	Wastes managed in this unit included partially polymerized wastes and ignitable liquid wastes from polystyrene production containing ethylbenzene, styrene, and acrylonitrile (D001 and D018).

Release Controls: The unit was located outdoors on concrete pads with curbs.

History of Documented Releases: No releases were documented from this unit.

Observations: The unit no longer exists, and the exact location of the storage areas is unknown. Tetra Tech did not photograph the former location of this unit.

SWMU 4 Former Hazardous Waste Storage Area

Unit Description: This unit was located at the southwestern end of the Styron plant south of the present Hazardous Waste Storage Area (SWMU 5). The unit consisted of a 50- by 100-foot area used to store 55-gallon drums of ignitable wastes (D001 and D018) generated in the polystyrene production area. The area was outdoors and did not have a concrete pad. The drums were stored on wooden pallets.

Date of Startup: The unit began operating in 1979.

Date of Closure: Available file information indicates that the unit closed in 1980. However, it is likely that it operated until 1982, when the present Hazardous Waste Storage Area (SWMU 5) began operating. The formal closure of the Former Hazardous Waste Storage Area was completed in December 1996. The closure plan was approved by OEPA and included the excavation and disposal of about 100 cubic yards of soil. The soil was transported and disposed of off site at Michigan Disposal, Inc., in Belleville, Michigan. Post-excavation soil samples were collected, and analytical results indicated that the area met the residential soil cleanup levels set forth in the approved closure plan.

Wastes Managed: Wastes stored in these drums consisted of liquid ignitable wastes, partially polymerized wastes, waste oil, various laboratory wastes, and

liquid byproduct from condensation collection (D001 and D018). The wastes contained primarily styrene, ethylbenzene, and acrylonitrile. The empty drums were crushed in the area with a backhoe and transported to the Hanging Rock Landfill for disposal.

Release Controls:

No release controls existed for this unit.

**History of
Documented Releases:**

About 50 gallons of styrene, ethylbenzene, and partially polymerized polystyrene were released from this unit during waste transfer associated with cleanup procedures conducted between 1978 and 1980. Contaminated soil was excavated and incinerated at Dow's Midland, Michigan, facility.

Observations:

The unit no longer exists. Tetra Tech observed the site of the Former Hazardous Waste Storage Area, which consisted of a grassy area adjacent to the present Hazardous Waste Storage Area (SWMU 5) (see Photograph No. 2).

SWMU 5

Hazardous Waste Storage Area

Unit Description:

This unit is located on the southwestern end of the Styron plant on D Street. The unit consists of a 24- by 20-foot sheet metal building with a steel frame and a sloped concrete floor. The open end of the pad is protected from run-on by an adjacent catch basin.

Date of Startup:

The unit began operating in 1982.

Date of Closure:

The unit is an active, RCRA-regulated unit.

Wastes Managed:

This unit primarily managed RCRA characteristic hazardous wastes (D001 and D018) consisting of partially polymerized polystyrene,

styrene, and ethylbenzene, and materials contaminated with these chemicals (such as, boots, gloves, process feed filters, and dirt mixtures). The wastes are stored on wooden pallets in 55-gallon drums and 14-gallon containers in this unit. Waste oil, various liquid wastes, Dowtherm, and laboratory wastes are also stored in this unit. Methylene chloride was also stored at this unit at one time. The drummed liquid wastes are transported to Safety Kleen in Bridgeport, New Jersey, for incineration. The drummed solid wastes are transported to the Green Valley Landfill in Smithfield, Kentucky, for disposal.

Release Controls:

The unit has a concrete pad with a 4-inch-high curb around three sides. At the approach to the pad, the curb is level with the floor of the pad. The floor slopes 0.5 inch per foot toward the southwestern corner of the pad, where a 2-foot by 2-foot by 6-inch-deep blind sump is located. The sump has a 960-gallon containment capacity. The pad is covered by a roofed, three-sided, sheet metal building. The open end of the pad is protected from run-on by a catch basin located along the front of the pad. A steel pole swinging gate is used to protect the drums from vehicular accidents.

History of
Documented Releases:

On June 8, 1987, two 14-gallon plastic drums on the bottom row of a pallet of drums in the unit collapsed. Waste poured from one of the drums, and a pool of liquid accumulated on the storage area floor. Dow responded by cleaning up the area the same day. The recovered waste was transported to Dow's Midland, Michigan, incinerator on July 1, 1987.

Observations:

During the VSI, the unit and drums appeared to be in good condition. The building contained about six drums of D001 and D018 liquid wastes stacked on wooden pallets. There was no evidence of

leaks or spills. No stains or cracks in the concrete floor inside the unit were noted during the VSI (see Photograph No. 3).

SWMU 6

Hazardous Waste Container Loading Area

Unit Description:

This unit consists of three garage door loading docks on the south side of Building 408 used to load drummed hazardous waste from the Hazardous Waste Storage Area (SWMU 5). Forklifts move the waste from the Hazardous Waste Storage Area (SWMU 5) up a ramp on the east side of Building 408 to the bay doors of licensed hazardous waste transporters. The building and driveway are constructed of concrete. No drains were observed in the area.

Date of Startup:

It is uncertain when the loading area was first used, but it is assumed to have been active since 1974, when drums were first stored on site.

Date of Closure:

The unit is active.

Wastes Managed:

This unit primarily managed partially polymerized polystyrene, styrene, ethylbenzene, waste oil, laboratory wastes, Dowtherm wastes, liquid wastes, and contaminated materials (such as, boots, gloves, and process feed filters). The loading area is used strictly for loading purposes. No hazardous waste is stored in Building 408.

Release Controls:

The unit's only release control is the concrete driveway.

History of Documented Releases:

No releases were documented from this unit.

Observations:

During the VSI, Tetra Tech did not observe any cracks or stains in the concrete driveway or loading dock area. Tetra Tech observed two rows

of wooden pallets stacked about 20 pallets high next to the loading dock (see Photograph No. 4).

SWMU 7

Former Road Side Staging Area

Unit Description: This unit consisted of about 40 14-gallon hazardous waste containers on wooden pallets temporarily stored along the gravel-lined road side near the Hazardous Waste Storage Area (SWMU 5). The containers were stored at this location because the Hazardous Waste Storage Area (SWMU 5) was filled to capacity. The unit measured about 10 by 20 feet in size. All containers were reportedly sealed.

Date of Startup: The Former Road Side Staging Area was documented for the first time in February 1987.

Date of Closure: This unit was last referred to in June 1987.

Wastes Managed: This unit primarily stored RCRA characteristic hazardous wastes (D001 and D018) consisting of partially polymerized polystyrene, styrene, ethylbenzene, liquid wastes, dirt mixtures, laboratory wastes, and materials contaminated with these chemicals (such as gloves, boots, and process feed filters).

Release Controls: -The unit had no apparent release controls.

History of Documented Releases: No releases were documented from this unit.

Observations: The unit no longer exists. During the VSI, no stains were observed in the area where the containers were once stored. Tetra Tech did not photograph the former location of this unit.

SWMU 8

Former Waste Fuel Storage Tanks

Unit Description:

The unit consisted of two vented, carbon steel, aboveground storage tanks located east of the Hazardous Waste Storage Area (SWMU 5). Each tank was about 40 feet high and had a capacity of 12,000 gallons. The pad was about 30 feet wide and 30 feet long. The 1989 VSI noted several cracks in both the asphalt and concrete portions of the pad, but no stains were noted.

Date of Startup:

The units were installed between 1979 and 1982.

Date of Closure:

The tanks were removed in 1990. However, no additional information regarding the removal is available.

Wastes Managed:

The unit stored partially polymerized polystyrene, styrene, and ethylbenzene, liquid byproduct, liquid wastes (D001 and D018). Soon after their installation, it was determined that the quality of the waste stored was not sufficient to burn as fuel in Process Boilers R1 and R3 (SWMU 10).

Release Controls:

The tanks were vented to prevent explosion, stood on a cement and asphalt pad, and were surrounded by a 2-foot-high clay berm with a gravel cover.

History of Documented Releases:

No releases were documented from this unit.

Observations:

The unit no longer exists. Tetra Tech observed the site of the Former Waste Fuel Storage Tanks (SWMU 8), and the area was paved over. Tetra Tech did not photograph the former location of this unit.

SWMU 9**Hazardous Waste Fuel Storage Tank****Unit Description:**

This unit is an aboveground, 5,000-gallon, insulated, carbon steel tank located near the intersection of B and Fifth Streets. The unit collects waste from condensate collection in the recycle organic tank farm. The waste is then pumped to Process Boilers R1 and R3 (SWMU 10) and used as fuel. The tank is located on a concrete pad with a dike and sump. Excess waste fuel from this tank is pumped into a tanker truck and transported to Safety Kleen in Bridgeport, New Jersey, for incineration.

Date of Startup:

The unit began operating in 1977.

Date of Closure:

The unit is currently an active, RCRA-regulated unit.

Wastes Managed:

Liquid byproduct waste fuel containing ethylbenzene, styrene, and small amounts of acrylonitrile and liquid wastes contaminated with these chemicals (D001 and D018) are stored in this unit for less than 90 days. Most of the fuel is burned in Process Boilers R1 and R3 (SWMU 10). In 1999, about 1,069,223 gallons of waste was burned. Some of the unused waste fuel is also transported to Safety Kleen in Bridgeport, New Jersey, for incineration.

Release Controls:

The tanks rest on a 2- to 3-foot-high concrete pedestal. The pedestal stands on an epoxy-lined concrete pad and is surrounded by a 2- to 3-foot-high cement dike. A blind sump with a pump is located in the southwestern corner of the containment system. Liquid in the sump is pumped to the Process Sewer System (SWMU 24). The tank is electrically grounded.

History of Documented Releases:	According to facility representatives a release from this unit has not occurred. However, a document titled "RCRA Part B Permit Application for BIF Units" refers to a 7,900-pound spill that reportedly occurred at this unit in 1997. No additional information is available regarding this spill.
Observations:	During the VSI, the tank was in good condition. Tetra Tech did not observe any stains or spills (see Photograph No. 5).
SWMU 10	Process Boilers R1 and R3
Unit Description:	This unit produces energy for the polystyrene production process. Boilers R1 and R3 burn D001 and D018 hazardous waste fuel. The boilers use Dowtherm as a heat transfer fluid. The boilers do not generate ash, but boiler blowdown is routed to the Process Sewer System (SWMU 24). Air emissions are regulated by an environmental permit. The boilers are located between B and C Streets, on the northwest corner of B and Fifth Streets. They are virtually identical in design and are capable of operating at 5.5×10^6 British thermal units per hour. The boilers are located on a concrete pad and are separated from each other by concrete walls.
Date of Startup:	Boiler R1 was installed in 1976. Boiler R3 was installed in 1968. Boilers R1 and R3 have been burning hazardous waste fuel since 1977. Prior to 1977, they burned natural gas.
Date of Closure:	The unit is active.
Wastes Managed:	The liquid byproduct and liquid wastes used as fuel in the boilers consists mainly of ethylbenzene and styrene and is a characteristic hazardous waste (D001 and D018).

Release Controls:

The boilers are located on a concrete pad and are separated from each other by concrete walls. They are surrounded by a 1-foot-high concrete berm and a wide concrete sidewalk or pad. Within the berm is a sump that connects to the Storm Water Drainage System (SWMU 17). The boilers and the Hazardous Waste Fuel Storage Tank (SWMU 9) are surrounded by a 3- to 5-foot-deep storm water drainage ditch, which is part of the Storm Water Drainage System (SWMU 17).

History of
Documented Releases:

No releases have been documented from this unit.

Observations:

The boilers appeared to be in good condition. Tetra Tech did not observe any spills or stains at the time of the VSI (see Photograph No. 6).

SWMU 11

Satellite Accumulation Area -Ethafoam Plant

Unit Description:

This unit consists of a roofed, 10- by 10-foot concrete area with a sloped roof north of and next to the Ethafoam plant. The unit is a satellite storage area for 55-gallon drums of various solid and liquid wastes stored on wooden pallets. The drummed wastes are eventually moved to the Hazardous Waste Storage Area (SWMU 5).

Date of Startup:

According to facility representatives, the unit has been in operation since 1957.

Date of Closure:

The unit is active.

Wastes Managed:

The unit manages D001 and D018 solid and liquid wastes including partially polymerized materials; contaminated solids such as gloves,

boots, rags, and process feed filter; contaminated liquid wastes; Dowtherm water or oil solutions; and contaminated lubricating oils.

Release Controls: The drums are stored in a covered area underlain by a concrete pad. No other release controls are present.

History of Documented Releases: No releases were documented from this unit.

Observations: No drums were stored at this unit at the time of the VSI. Tetra Tech observed some staining and a few cracks in the concrete pad (see Photograph No. 7).

SWMU 12 Former Methylene Chloride Cleaning Tank

Unit Description: This unit is located on A Street in the northwest corner of the Styron plant next to the recycle organic tank farm. The tank is 10 feet high and about 4 feet in diameter. The tank stands on a railroad tie over a 10- by 10-foot concrete pad. The pad has a 6-inch-high concrete curb. The tank was used to clean partially polymerized polystyrene from a particular piece of equipment in the polystyrene process. The tank was designed so that the equipment to be cleaned could be bolted to it. At the beginning of the cleaning process, the polystyrene production process was shut down, and the piece of equipment was removed and brought to the tank with a crane. The equipment was bolted to the tank, and methylene chloride was pumped through the tank from the bulk delivery truck. After the cleaning, the spent methylene chloride was pumped back into the delivery truck and transported to Chemical Solvents, Inc., in Cleveland, Ohio, for reclamation. Excess spent methylene chloride was drummed and moved to the Hazardous Waste Storage Area (SWMU 5) prior to transport for incineration. The entire

cleaning process lasted 5 to 7 days. The methylene chloride was reportedly contained at all times.

Date of Startup: The unit began operating in 1983.

Date of Closure: According to facility representatives, Dow discontinued use of the unit in 1993. The tank was removed and replaced in 1998. However, the new tank has reportedly not been used. The facility currently uses a hydroblast method for cleaning equipment used in the polystyrene process.

Wastes Managed: Methylene chloride (F002) was delivered to the facility in a truck by Chemical Solvents, Inc., and pumped into the tank during the cleaning process. The methylene chloride was pumped back into the truck when the cleaning process ended. Periodically, excess spent methylene chloride that could not be recovered was drummed and moved to the Hazardous Waste Storage Area (SWMU 5).

Release Controls: The unit has a concrete pad and a 6-inch-high concrete curb.

History of Documented Releases: No releases were documented from this unit.

Observations: The area appeared to be in good condition, and no spills were observed at the time of the VSI. Tetra Tech did not photograph the former location of this unit.

SWMU 13 Outdoor Off-Specification Product Storage Area

Unit Description: This unit is located on the south side of Building 509. During the VSI, the unit contained about 75 wooden pallets of off-specification product from the Ethafoam plant. Some of pallets were surrounded by cardboard

boxes. The surface of the storage area is asphalt, and the area is not enclosed.

Date of Startup: This area has been used periodically for several years as an off-specification product storage area. Facility representatives did not know how many years this particular unit has been used for storage. Off-specification product is reportedly stored for less than 1 month in this area.

Date of Closure: According to facility representatives, the area is used as needed.

Wastes Managed: Nonhazardous off-specification product only is stored in this unit. The product is sold to a reclaimer and removed within a 1-month period.

Release Controls: The unit has no release controls except the asphalt surface.

History of Documented Releases: No releases were documented from this unit.

Observations: During the VSI, most of the pallets of off-specification product (Ethafom) were stored in an orderly manner (see Photograph No. 8). However, around pallets that did not have cardboard boxes around them, off-specification product fell onto the ground surface.

SWMU 14

Indoor Off-Specification Product Storage Area

Unit Description: This unit is located in the Ethafom warehouse section of Building 504 in the Ethafom plant. The off-specification product originates in the Ethafom and Styrofoam plants and is stored in 4- by 4- by 4-foot open-topped cardboard boxes on wooden pallets.

Date of Startup: It is not known how long this particular area has been used for storage.

Date of Closure: According to facility representatives, the area is used as needed.

Wastes Managed: Nonhazardous fully polymerized, off-specification product only is stored in this unit.

Release Controls: The boxes are stored in a warehouse with a coated concrete floor.

History of Documented Releases: No releases were documented from this unit.

Observations: Tetra Tech was unable to observe this area during the VSI because of construction activities at the entrance to this unit. The description presented above is based on available file information and interviews with facility representatives during the VSI.

SWMU 15

Two-Section Septic Tank System

Unit Description: The unit is located south of the main office building. The 16- by 20-foot septic tank system is constructed of concrete; has a capacity of 2,600-gallons; and is located at 8 feet bgs. The first tank is a settling tank. The second tank receives overflow from the first tank. Water from the second tank is routed to the Wastewater Treatment System (SWMUs 38-40). The integrity of the septic system is unknown because of its underground location.

Date of Startup: The Two-Section Septic Tank System began operating in 1957. From 1957 until 1976, the septic system received both septic and process waters. After 1976, the septic system received only septic waters.

Date of Closure: The unit is active.

Wastes Managed: From 1957 until 1976, the septic system received both septic and process waters. The process water contained hazardous constituents such as ethylbenzene, styrene, and acrylonitrile, as well as oil and dirt.

Release Controls: This unit has no known release controls.

History of Documented Releases: No releases were documented from this unit.

Observations: Tetra Tech observed the unit location, which is in a grassy area (see Photograph No. 9). No staining or disturbed vegetation were observed in the vicinity of the unit at the time of the VSI.

SWMU 16

Solid Waste Dumpsters

Unit Description: Solid waste Dumpsters are located throughout the facility. The Dumpsters store nonhazardous wastes including scrap foam, paper, wood, uncontaminated gloves, and general housekeeping wastes.

Date of Startup: The Dumpsters have probably been in use since the plant began operations in 1957.

Date of Closure: The unit is active.

Wastes Managed: This unit manages scrap foam, paper, wood, uncontaminated gloves, and general housekeeping waste.

Release Controls: All of the Dumpsters are located indoors on concrete floors or outdoors on an asphalt surface. Some have curbs and drains (see Photograph No. 10).

History of
Documented Releases: No releases were documented from this unit.

Observations: The Dumpsters observed during the VSI appeared to be in good condition (see Photograph No. 10).

SWMU 17 Storm Water Drainage System

Unit Description: The Styron plant's Storm Water Drainage System surrounds and dissects the Styron plant (see Photograph No. 11). The system consists of drainage ditches, sewers, and roof drains for the Styrofoam and Ethafoam plants. The unit generally consists of 3-foot-deep, natural clay, gravel-lined ditches and grates. However, some parts of the system are natural drainageways along roads, with no lining. The sewer lines are made of concrete. All water from the system is routed to the Fire Protection Collection Basin (SWMU 37) and then treated in the Wastewater Treatment System (SWMUs 38-40) prior to discharge to the Drainage Ditch to Big Thief Creek (SWMU 18).

Date of Startup: The drainage ditches have operated since 1957. The ditches in the Styron plant were rebuilt in 1964.

Date of Closure: The unit is active.

Wastes Managed: All storm water runoff from the Styron plant and the acrylonitrile and tank farm dikes flows through this unit. Because the Styron plant is outdoors, storm water runoff comes into contact with several objects and containers and has the potential for picking up hazardous constituents, from Dowtherm containers, raw material storage containers, and process reactors. The storm water runoff could also contain small amounts of hazardous constituents such as oil, styrene, ethylbenzene, solvents, and acrylonitrile.

Release Controls: The unit serves as a release control in case any of the dikes in the three plants fail or a large spill occurs. The unit itself apparently has no release controls other than the natural clay layer underlying the site.

History of Documented Releases: No releases have been documented from this unit.

Observations: Tetra Tech observed a section of the system in the Styron plant (see Photograph No. 11). The steel grate over the drain appeared to be in good condition, and the drain was dry at the time of the VSI.

SWMU 18 Drainage Ditch to Big Thief Creek

Unit Description: This unit is a grass-lined surface water drainage ditch 3 to 5 feet deep. From 1957 to 1992, the ditch received water directly from the Storm Water Drainage System (SWMU 17) and Former Fire Pond (SWMU 31) and discharged into Big Thief Creek. Currently, the ditch receives only treated wastewater from the Wastewater Treatment System (SWMUs 38-40). The length of the ditch is unknown.

Date of Startup: The surface water drainage ditch has existed since 1957. The ditch was rebuilt and graded in 1964.

Date of Closure: The unit is active.

Wastes Managed: From 1957 to 1992, the unit received runoff from the Styron plant through the Storm Water Drainage System (SWMU 17) and treated wastewater discharge from the Former Fire Pond (SWMU 31). During this period, water in the ditch likely contained hazardous constituents including ethylbenzene, styrene, and acrylonitrile. Currently, the ditch receives only treated wastewater from the Wastewater Treatment System (SWMUs 38-40).

Release Controls: Two skimmers and two slide gate valves are located in the unit near the creek.

History of Documented Releases: On January 13, 1988, a styrene monomer spill occurred in the drainage ditch in the vicinity of the styrene storage tanks. The spill was cleaned up, contaminated soil was removed, and the area was backfilled with clean fill. In addition, in 1989, untreated process water released from the Former Aerated Skimmer Basin (SWMU 32) to the surface water in this unit. The process water release rate was about 1 gpm. The water was reportedly very oily and emitted a strong organic odor.

Observations: The drainage ditch appeared to be in good condition during the VSI (see Photograph No. 12). No oily sheen or discolored water was observed in the drainage ditch.

SWMU 19

Drainage Ditch to North

Unit Description: This unit is a slight depression leading from the northern part of the Styron plant to a ditch that runs along the Norfolk and Western Railroad line south of State Highway 52. The ditch is about 100-feet long. The drainage ditch and the surrounding grounds of the Styron plant are covered by pea gravel. The ditch collects a storm water runoff from the northernmost part of the Styron plant.

Date of Startup: The drainage ditch has been operating since 1957.

Date of Closure: The unit is active.

Wastes Managed: The unit manages storm water runoff. However, product and raw material spills could enter this unit if the spills are uncontained.

Release Controls: This unit has no release controls. However, runoff flowing into this unit is primarily generated by noncontact precipitation. The acrylonitrile and recycle organic tank farm tanks have separate containment to prevent runoff to this ditch.

History of Documented Releases: No releases were documented from this unit.

Observations: During the VSI, no oily sheen or discolored water was observed in the drainage ditch. However, the ditch appeared to collect sandy sediment (see Photograph No. 13).

SWMU 20 Pellet Car Washing Area and Sump

Unit Description: This unit is located in a covered building attached to the west side of Building 407. The building measures about 120 by 60 feet. The unit consists of two sets of rails inset into a concrete pad. The area is used to clean railcars after the removal of polystyrene pellets (raw material). Wastewater from this unit drains to a sump, where the pellets settle out. The liquid is routed to the Process Sewer System (SWMU 24). The pellets are shoveled out of the sump when dry and used as raw material.

Date of Startup: The date of startup for this unit is unknown.

Date of Closure: The unit is active.

Wastes Managed: Wastewater from the unit routed to the Process Sewer System (SWMU 24) contains oil and dirt from the railcars. The pellets, which settle out of the water in the sump, are nonhazardous polystyrene.

Release Controls: The unit is indoors and has a concrete floor and sump for collecting solids.

History of
Documented Releases:

No releases were documented from this unit.

Observations:

During the VSI, the concrete floor and sump appeared to be in good condition at the time of the VSI (see Photograph No. 14). No stains or cracks were observed in the concrete pad. The sump was dry but contained some pellets.

SWMU 21

Forklift Washing Area and Sump

Unit Description:

This unit is located in the northeast corner of Building 505. The unit is used to clean forklifts and consists of a 12- by 12-foot area with concrete walls on three sides and a concrete floor with a sump in the center. The sump drains to the Process Sewer System (SWMU 24).

Date of Startup:

The date of startup for this unit is unknown.

Date of Closure:

The unit is active.

Wastes Managed:

The unit manages wastewater primarily containing dirt, oil, and small quantities of foam products from the different plant areas. Hazardous constituents may be present but reportedly only at extremely low concentrations.

Release Controls:

The unit is located indoors and has a concrete pad with a sump that drains to the Process Sewer System (SWMU 24).

History of
Documented Releases:

No releases were documented from this unit.

Observations:

During the VSI, Tetra Tech observed some staining on the concrete pad near the sump (see Photograph No. 15). No cracks in the concrete pad were observed.

SWMU 22

Evaporative Cooling Tower – Styron Plant

Unit Description:

This unit consists of a standard contact cooling water evaporative tower for the Styron plant cooling water system. The capacity of the cooling tower is unknown. The unit is located on the southwest corner of Fifth and B Streets across from Process Boilers R1 and R3 (SWMU 10). Influx and outflow from the plant to the tower is routed under B Street the Styron plant. Cooling tower blowdown is routed to the Storm Water Drainage System (SWMU 17). The cooling water may contain small quantities of impurities because it comes from a cooling bath that contacts final product.

Date of Startup:

It is uncertain when the unit was initially installed. However, because the Styron plant began operating in 1968, it is assumed that the cooling tower was installed at this time.

Date of Closure:

The unit is active.

Wastes Managed:

This unit manages contact cooling water from the Styron plant that may contain small quantities of ethylbenzene, acrylonitrile, styrene, and partially polymerized material.

Release Controls:

The cooling tower is located on a concrete pad.

History of Documented Releases:

No releases were documented from this unit.

Observations:

During the VSI, the unit appeared to be in good condition (see Photograph No. 16).

SWMU 23

Former Evaporative Cooling Towers – Ethafoam Plant

Unit Description: This unit was located north of Building 504 on a concrete pad. The towers consisted of closed-loop, radiator-style, evaporative cooling towers that cooled noncontact cooling water from the Ethafoam plant and contact cooling water from the Ethafoam recycling operation. The capacity of the former cooling towers is unknown. Cooling tower blowdown was collected in a sump and discharged to the Process Sewer System (SWMU 24).

Date of Startup: The unit began operating in 1962.

Date of Closure: The unit was removed in 1992. No additional information is available regarding the removal.

Wastes Managed: The unit managed contact cooling water that may have contained constituents such as catalysts or blowdown agents.

Release Controls: The unit had a sump that discharged to the Process Sewer System (SWMU 24) and a concrete pad.

History of Documented Releases: No releases were documented from this unit.

Observations: The unit no longer exists. Tetra Tech observed the site of the former cooling towers, and the area is paved over. Tetra Tech did not photograph the former location of this unit.

SWMU 24

Process Sewer System

Unit Description:

This unit is constructed of preformed cement pipes packed with oakum caulking. The unit's integrity is unknown because it is located underground. The system receives discharges from most on-site sumps, including forklift washwater, pellet car washwater, cooling tower and boiler blowdown, and storm water from the Storm Water Drainage System (SWMU 17) and the Dike and Sump System for Runoff and Spill Collection (SWMU 34).

Date of Startup:

The unit began operating in 1964.

Date of Closure:

The unit is active.

Wastes Managed:

This unit manages process waters likely to contain hazardous constituents, including ethylbenzene, styrene, and acrylonitrile, as well as oil, dirt, solvents, and foam particles. All process waters are routed first to the Fire Protection Collection Basin (SWMU 37) and then to the Wastewater Treatment System (SWMUs 38-40) for treatment. After treatment, the water is discharged to the Drainage Ditch to Big Thief Creek (SWMU 18).

Release Controls:

The unit serves as a release control for most of the facility because most of the sumps discharge to it. The integrity of the unit is unknown.

History of Documented Releases:

A 1993 subsurface investigation conducted by Dow's contractor, revealed the presence of ethylbenzene, styrene, and traces of acrylonitrile in subsurface soil along the segment of the unit sewer line underlying the Former Hazardous Waste Storage Area (SWMU 4). Data showed that the unit was contributing to the constituents detected in the

subsurface soil. As a result, a 235-foot-long section of the process sewer line and contaminated soil were removed and replaced in 1997.

Observations: During the VSI, the unit was not accessible for inspection because of its underground location (see Photograph No. 17).

SWMUs 25-28

Former Wastewater Treatment System

Unit Description: These units consisted of four SWMUs, an Aerator (SWMU 25), a Clarifier (SWMU 26), a Chlorinator (SWMU 27), and two Tertiary Sand Filters (SWMU 28). The units were located west of the Former Fire Pond (SWMU 31) and constructed of concrete and built into the ground. Process wastewater from the former Aerated Skimmer Basin (SWMU 32) and sanitary wastewater from the septic tank flowed into the 15,000-gallon Aerator (SWMU 25). From there, it was routed to the Clarifier (SWMU 26). After clarification, the water was alternately routed to one of two tertiary Sand Filters (SWMU 28). The system treated about 11,200 gallons of water per day.

Date of Startup: The system was installed in 1976.

Date of Closure: All four units were removed and replaced by a new Wastewater Treatment System (SWMUs 38-40) in 1992.

Wastes Managed: The former units treated the facility's process and septic waters. The process water included water from most on-site sumps, forklift washwater, pellet car washwater, contact cooling water from the Styron plant, noncontact cooling water, and boiler blowdown. The water routed to the treatment system likely contained ethylbenzene, styrene, acrylonitrile, oil, dirt, solvents, and foam particles.

Release Controls: These units apparently had no release or overflow controls.

History of
Documented Releases:

No releases were documented from these units.

Observations:

The units no longer exist and have been replaced with a new Wastewater Treatment System (SWMUs 38-40) that was installed in the same general area. Tetra Tech did not photograph the former location of the units.

SWMU 29

Former Used Filter Sand Pile

Unit Description:

This unit was located southeast of the Former Hazardous Waste Storage Area (SWMU 4). Filter sand was temporarily stored on the ground just a few feet west of the former sand filters in this unit. The sand was periodically transported to the Hanging Rock Landfill for disposal. The rate of filter sand generation is unknown. Available information indicates that this was not a routine facility practice.

Date of Startup:

The date of startup for this unit is unknown.

Date of Closure:

The unit became inactive when the Former Wastewater Treatment System (SWMUs 25-28) was replaced in 1992.

Wastes Managed:

Process and septic waters were filtered through these sands after aeration and clarification in the Former Wastewater Treatment System (SWMUs 25-28). The filter sand may have contained hazardous constituents such as ethylbenzene and styrene. When a filter became plugged, the sand was removed and transported to the Hanging Rock Landfill, where Dow had a permit to dispose of the sand.

Release Controls:

This unit apparently had no release controls.

History of
Documented Releases: No releases were documented from this unit.

Observations: The unit no longer exists. Tetra Tech did not observe any stains in the area where the sand pile was located. Tetra Tech did not photograph the former location of this unit.

SWMU 30 Former Well Water Treatment Backflush Sump

Unit Description: Well water obtained from the on-site water wells was used for process water until 1992. The water was treated in the well water treatment system prior to use. This well water treatment system is located in Building 409, which is also the unit's location. The sump received backflush from the ion exchange water softening column and sand filters from the well water treatment system. The backflush was discharged directly to the Former Fire Pond (SWMU 31).

Date of Startup: The date of startup for this unit is unknown.

Date of Closure: The unit has been inactive since 1992.

Wastes Managed: The sump received about 2,000 gallons per day of backflush from the ion exchange column and the sand filters. This backflush, which may have contained filter sand and salt, was discharged directly to the Former Fire Pond (SWMU 31).

Release Controls: The unit served as the release control for the entire well water treatment facility. The unit itself apparently had no release control.

History of
Documented Releases: No releases were documented from this unit.

Observations: The unit is no longer used but appeared to be in good condition at the time of the VSI. Tetra Tech did not photograph the former location of this unit.

SWMU 31

Former Fire Pond

Unit Description: The Former Fire Pond was located in the northwest corner of the intersection of Fifth and E Streets. The pond was about 80 feet long, 50 feet wide, 20 feet deep, and had a capacity of 1.8 million gallons. It was surrounded by a 2-foot-high berm with a rubber liner. The floor of the pond consisted of compacted clay. The pond received discharge from the Former Wastewater Treatment System (SWMUs 25-28) and backflush from the Former Well Water Treatment Backflush Sump (SWMU 30). The pond overflowed into the Drainage Ditch to Big Thief Creek (SWMU 18) at a rate of about 6 to 8 gpm.

Date of Startup: The unit began operating in 1966.

Date of Closure: The unit underwent closure in 1996. Dow's contractor, Environmental Resources Management, Inc., conducted closure activities, which included pond dewatering, sampling of soil and sludge underlying the rubber liner, liner removal, soil excavation and disposal, and pond backfilling and grading. The pond achieved clean closure in accordance with OEPA standards in 1997.

Wastes Managed: The pond received discharge from the Former Wastewater Treatment System (SWMUs 25-28) and backflush from the Well Water Treatment Backflush Sump (SWMU 30).

Release Controls: The unit had a compacted clay bottom with a rubber liner and a 2-foot-high berm.

History of Documented Releases: No releases were documented from this unit.

Observations: Tetra Tech observed the site of the Former Fire Pond, which consisted of a grassy area adjacent to the new Wastewater Treatment System (SWMUs 38-40).

SWMU 32 **Former Aerated Skimmer Basin**

Unit Description: This unit consisted of a concrete basin with a capacity of 9,000 gallons located southwest of the Former Wastewater Treatment System (SWMUs 25-28). The unit received untreated process water from the Process Sewer System (SWMU 24). It served as an aerator and had an overflow/underflow weir system for oil-water separation. Oil was skimmed off the water in the basin, and the remaining water was pumped to the Former Wastewater Treatment System (SWMUs 25-28). However, during periods of high flow to the Former Wastewater Treatment System (SWMUs 25-28), the weir system sometimes allowed untreated overflow to discharge to the Drainage Ditch to Big Thief Creek (SWMU 18).

Date of Startup: The aerated skimmer basin was installed along with the Former Wastewater Treatment System (SWMUs 25-28) in 1976.

Date of Closure: The unit was removed along with the Former Wastewater Treatment System (SWMUs 25-28) and replaced with the Fire Protection Collection Basin (SWMU 37) in 1992.

Wastes Managed: The aerated skimmer basin received water from the Process Sewer System (SWMU 24). This water reportedly contained small amounts of several hazardous constituents, including ethylbenzene, styrene, acrylonitrile, and solvents, as well as oil and dirt.

Release Controls: The unit's only release control was a pump that pumped aerated water to the Former Wastewater Treatment System (SWMUs 25-28).

History of Documented Releases: During the 1989 VSI, a release of untreated process water to the surface water Drainage Ditch to Big Thief Creek (SWMU 18) occurred. The pump in the basin was too small to offset an increase in the amount of process water from the Process Sewer System (SWMU 24). The estimated rate of discharge was about 1 gpm. The water was reportedly very oily and emitted a strong organic odor.

Observations: The unit no longer exists. Tetra Tech observed the site of the Former Aerated Skimmer Basin, which is now the location of the Fire Protection Collection Basin (SWMU 37). Tetra Tech did not photograph the former location of this unit.

SWMU 33

Dowtherm Satellite Accumulation Areas

Unit Description: Dowtherm is stored in 55-gallon drums in this unit at various locations throughout the Styron plant. The Dowtherm satellite areas are reportedly used as needed, and their locations apparently vary with time. During the VSI, no areas appeared to be designated Dowtherm satellite accumulation areas. The Dowtherm is reused if possible or sent to a reclaimer.

Date of Startup: The unit has probably been in existence since the Styron plant began using Dowtherm as a heat transfer fluid in 1968.

Date of Closure: The unit is active.

Wastes Managed: This unit manages Dowtherm, a proprietary heat transfer oil, which contains dirt, grit, and other contaminants.

Release Controls:	The drums observed during the VSI were covered and located on concrete pads, but some of them were not located within bermed areas.
History of Documented Releases:	In 1987, a small fire occurred near the process boilers that was reportedly related to a Dowtherm spill in one of the satellite accumulation areas.
Observations:	During the VSI, the drums appeared to be in good condition. Tetra Tech observed staining on some of the concrete pads.
SWMU 34	Dike and Sump System for Runoff and Spill Collection
Unit Description:	All of the storage tanks and process boilers at the facility are diked and rest on concrete pads. The dikes contain spills, and the sumps pump the collected water to the Process Sewer System (SWMU 24). The dikes and sump are located throughout the facility. The exact number of dikes and sumps is unknown.
Date of Startup:	The dike and sump system has been operating since the establishment of the Styron plant in 1968.
Date of Closure:	The unit is active.
Wastes Managed:	The unit collects and contains runoff and spills from storage tanks and boilers. The runoff and spills may contain hazardous constituents, including ethylbenzene, styrene, acrylonitrile, oil, Dowtherm, and solvents.
Release Controls:	The unit is a release control for the storage tanks and boilers. The unit itself apparently has no release controls.

History of Documented Releases:	No releases were documented from this unit.
Observations:	During the VSI, the concrete pads, dikes, and sumps appeared to be in good condition (see Photograph No. 18).
SWMU 35	Recycle Styrofoam Cooling Bath
Unit Description:	This unit is located in Building 532 and consists of a contact cooling bath from extruded recycled styrofoam. The bath is a steel trough about 20 feet long by 2 feet wide by 6 inches deep. A ribbon of recycled polystyrene flows submerged in the bath and runs through a vacuum dryer at the end. The contact cooling water is recycled, and the system is bled to the Process Sewer System (SWMU 24).
Date of Startup:	The recycle styrofoam bath has operated since the styrofoam process began in 1957.
Date of Closure:	The unit is active.
Wastes Managed:	The unit manages contact cooling water that may contain small amounts of ethylbenzene, styrene, and blowing agents.
Release Controls:	The unit, which is located indoors, is underlain by a concrete floor that has a blind sump.
History of Documented Releases:	No releases were documented from this unit.
Observations:	During the VSI, the unit appeared to be in good condition.

SWMU 36**Former 250-Gallon Pressurized Storage Tanks**

Unit Description: This unit consisted of about 20 250-gallon pressurized tanks located throughout the facility used to store liquid wastes. According to the 1989 PA/VSI report, the storage tanks often had no release controls, and there was reportedly no standard protocol to ensure proper waste handling and disposal.

Date of Startup: The date of startup for this unit is unknown.

Date of Closure: Dow discontinued use of the tanks in 1995.

Wastes Managed: The unit was used to store waste solvents, waste oils, polymerized styrene, and other liquid process wastes.

Release Controls: The unit had no release controls.

History of Documented Releases: No releases were documented from this unit.

Observations: Tetra Tech observed two of the formerly used storage tanks south of Building 401 (see Photograph No. 19). According to facility representatives, the two tanks contain solid polymerized styrene. Facility representatives did not know how long the material had been stored at this location.

SWMU 37**Fire Protection Collection Basin**

Unit Description: This unit consists of a concrete basin with a capacity of 250,000 gallons located north of the Wastewater Treatment System (SWMUs 38-40). The unit receives untreated process water from the Process Sewer System (SWMU 24). It has an overflow/underflow weir system for oil-

water separation. Oil is skimmed off the water in the basin, and the remaining water is pumped to the Wastewater Treatment System (SWMUs 38-40).

Date of Startup: The system began operating in 1992.

Date of Closure: The unit is active.

Wastes Managed: The unit receives water from the Process Sewer System (SWMU 24). This water contains small amounts of several hazardous constituents, including ethylbenzene, styrene, acrylonitrile, and solvents, as well as oil and dirt.

Release Controls: The collection basin is constructed of concrete and pumps water to the Wastewater Treatment System (SWMUs 38-40).

History of Documented Releases: No releases were documented from this unit.

Observations: During the VSI, the unit appeared to be in good condition (see Photograph No. 20).

SWMU 38-40 Wastewater Treatment System

Unit Description: This unit consists of three SWMUs, an Aerator System (SWMU 38), a Clarifier (SWMU 39), and a Tertiary Sand Filter System (SWMU 40). The unit is located north of the Former Fire Pond (SWMU 31). Process wastewater from the Fire Protection Collection Basin (SWMU 37) and sanitary wastewater from the septic tank flows into one of the two 5,000-gallon Aerators (SWMU 38). From there, it is routed to the Clarifier (SWMU 39). After clarification, the water is routed to the Tertiary Sand Filter System (SWMU 40). The filtered water is then discharged to the

Drainage Ditch to Big Thief Creek (SWMU 18) and monitored at Outfall 001. The system treats about 17,000 gallons of water per day.

Date of Startup: The system began operating in 1992.

Date of Closure: The units are active.

Wastes Managed: The unit treats the facility's process and septic waters and storm water runoff. The process water includes water from most on-site sumps, forklift washwater, pellet car washwater, and contact cooling water from the Styron plant. The water routed to the system likely contains ethylbenzene, styrene, acrylonitrile, oil, dirt, solvents, and foam particles.

Release Controls: The unit is underlain by concrete and has a collection sump to contain spills. Spills are collected in the sump and reprocessed through the system.

History of Documented Releases: No releases were documented from these units.

Observations: During the VSI, the units appeared to be in good condition (see Photograph No. 21).

4.0 AREAS OF CONCERN

Tetra Tech identified no AOCs during the PA/VSI. However, five AOCs were identified during the PA/VSI conducted in 1989. These AOCs are discussed below.

- AOC 1 Styrene Spill Near Pump for Styrene Storage Tanks:** In January 1988, a styrene monomer spill occurred in the diked pump area near the on-site styrene storage tanks. The spill was cleaned up, and contaminated soil was excavated and replaced. According to Dow facility representatives, the area has since been diked and a clay liner has been installed to contain spills in the styrene pump area. Also, the facility monitors for styrene at Outfall 001 in Big Thief Creek.
- AOC 2 Blowing Agent Spill:** In August 1988, a blowing agent spill occurred in the Styrofoam plant. The blowing agent, ethyl chloride, reportedly vaporized almost immediately; therefore, no further action is required.
- AOC 3 Process Filter Area:** Process filters were not stored within a bermed area during the 1989 VSI, but the filters are now stored in a bermed area.
- AOC 4 Underground Catalyst Storage Tank:** A 10,000-gallon steel tank housed in an underground concrete vault in the Styron plant stored blowing agent during the 1989 VSI. According to facility representatives, the tank was taken out of service in December 1999.
- AOC 5 Anecdotal Release Information:** Information from OEPA officials indicates that anonymous tips had been given to OEPA regarding various styrene monomer spills and waste dumping near the employee recreational area. Verification of these incidents has not been made. Facility representatives were unaware of waste dumping in the employee recreational area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The PA/VSI identified 40 SWMUs and no AOCs at the Dow facility. Background information on the facility's location, operations, waste generating processes and waste management practices, history of documented releases, regulatory history, environmental setting, and receptors is presented in Section 2.0. SWMU-specific information, such as the unit's description, dates of operation, wastes managed, release controls, history of documented releases, and observed condition, is presented in Section 3.0. Following are Tetra Tech's conclusions and recommendations for each SWMU. Table 3, located at the end of this section, summarizes the SWMUs at the facility and the recommended further actions.

SWMU 1 Former Flaring Pad

Conclusions: This unit is located on the site of the present maintenance building (Building 505). The unit consists of a concrete slab used to burn wastes using an aspirated system. Although the past potential for release to soil, groundwater, and air is high, the extent of past contamination cannot be investigated because all soil beneath and surrounding the unit was removed during construction of the maintenance building.

On-Site Soil and Groundwater: There is no potential for release to soil or groundwater from this unit because no spills or releases were documented. Furthermore, the unit no longer exists and the maintenance building was constructed over the site. During the unit's operation, there was a moderate potential for soil contamination in the immediate vicinity of the pad because the pad was not curbed to contain runoff. The extent of this soil contamination can no longer be investigated because the soil surrounding and beneath the pad was removed during construction of the maintenance building.

Surface Water: There is no potential for release to surface water from this unit because the unit no longer exists. During the unit's operation, there was a low potential for release to surface water because of the distance from the unit to surface water.

Air: Presently, there is no potential for release to air from this unit because the unit no longer exists. During the unit's operation, air releases occurred.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 2

Former Waste Pile

Conclusions: The unit was located on the site of the Former Fire Pond (SWMU 31). This unit was a 60- by 60-foot area used to accumulate and subsequently burn process filters, wood pallets, scrap product, contaminated boots and gloves, waste paper and other solid wastes.

On-Site Soil and Groundwater: Presently, there is no potential for release to soil or groundwater from this unit because the unit no longer exists. During operation, the potential for release to soil from ash in the unit was high. The extent of this contamination cannot be investigated because soil and sediment beneath and around the unit were completely removed during excavation for the Former Fire Pond (SWMU 31).

Surface Water: There is no potential for release to surface water from this unit because the unit no longer exists and soil and sediment beneath and around the unit were completely removed during excavation for the Former Fire Pond (SWMU 31). During operation, the unit had a high potential for release to surface water because of the proximity of the unit to the Drainage Ditch to Big Thief Creek (SWMU 18).

Air: Presently, there is no potential for release to air from this unit because the unit no longer exists. During the unit's operation, air releases occurred.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 3**Former Hazardous Waste Storage Areas – Styron Plant**

Conclusions: This unit was reportedly located in three or four areas throughout the Styron plant used to temporarily store about 1,000 55-gallon drums of polystyrene wastes. All wastes were removed, and the unit no longer exists. There is no potential for past or ongoing releases to soil and groundwater, surface water, and air from the unit because the unit has no evidence or history of releases.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 4**Former Hazardous Waste Storage Area**

Conclusions: This unit was located in the southwestern end of the Styron plant south of the present Hazardous Waste Storage Area (SWMU 5). The unit was located outdoors and did not have a concrete pad. During the unit's operation, there was a high potential for release to soil, groundwater, surface water, and air. However, presently there is no potential for release to these media from the unit because it no longer exists and the unit underwent closure in 1996. During closure, contaminated soil was excavated and disposed of in accordance with OEPA requirements.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 5**Hazardous Waste Storage Area**

Conclusions: This unit is located on a 24- by 20-foot concrete pad on D Street on the southwestern end of the Styron plant. The concrete pad has a 4-inch-high concrete berm around three sides. The entrance to the pad has a blind sump with a 960-gallon capacity. This unit has a low potential for release to soil, groundwater, surface water, and air.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 6**Hazardous Waste Container Loading Area**

Conclusions: This unit is located on the south side of Building 408. Three garage door loading docks are used to load drummed hazardous wastes. No spills have been documented from this unit, and the driveway and building are made of concrete. No drains were observed in the area. The unit has a low potential for release to soil, groundwater, surface water, and air.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 7**Former Road Side Staging Area**

Conclusions: This unit was located along the gravel road near the Hazardous Waste Storage Area (SWMU 5). About 40 14-gallon hazardous waste containers on wooden pallets were temporarily stored in this unit. During the unit's operation, it had a moderate potential for release to soil, groundwater, surface water, and air because the unit had no release controls. Presently, the unit has no potential for release to soil, groundwater, surface water, and air because this unit no longer exists.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 8**Former Waste Fuel Storage Tanks**

Conclusions: This unit was located immediately east of the Hazardous Waste Storage Area (SWMU 5). The tanks were placed on a concrete and asphalt pad and surrounded by a 2-foot-high clay berm with a gravel cover. The pad reportedly contained several cracks in both the asphalt and concrete portions. During the unit's operation, it had a moderate potential for release to soil and groundwater and a low potential for past and present releases to all other media. According to facility representatives, the unit was remediated in 1990. However, details of the remediation were not available for review.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 9 Hazardous Waste Fuel Storage Tank

Conclusions: This unit is located near the intersection of B and Fifth Streets on a concrete pad with a concrete dike and sump. The unit collects waste from the recycle organic tank farm. The unit has a low potential for release to soil, groundwater, surface water, and air because of the concrete containment and a 2- to 3-foot-high cement dike surrounding the unit.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 10 Process Boilers R1 and R3

Conclusions: This unit is located between B and C Streets on the northwest corner of B and Fifth Streets. The boilers are on a concrete pad, separated by concrete walls, and surrounded by a 1-foot-high concrete berm. The units are regulated by air permits. No spills or releases were documented from this unit; therefore, the unit has a low potential for release to soil, groundwater, surface water, and air.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 11 Satellite Accumulation Area – Ethafoam Plant

Conclusions: This unit is located north of and next to the Ethafoam plant. The area is used as a storage area for various solid and liquid wastes, some of which are hazardous. During the VSI, Tetra Tech observed staining and some small cracks in the concrete pad. No spills or releases were documented from this unit.

On-Site Soil and Groundwater: The unit has a moderate potential for release to soil and groundwater because of the cracks observed in the concrete pad during the VSI.

Surface Water and Air: The unit has a low potential for release to surface water and air because no releases were documented from this unit.

Recommendations: Tetra Tech recommends repairing the cracks in the concrete pad to reduce the potential for release.

SWMU 12 Former Methylene Chloride Cleaning Tank

Conclusions: This unit is located next to the recycle organic tank farm on A Street in the northwestern corner of the Styron plant. The tank stands on a railroad tie over a concrete pad with a 6-inch-high concrete curb. This unit was used to clean partially polymerized polystyrene from a particular piece of equipment in the polystyrene process. During the unit's operation, it had a low potential for release to soil, groundwater, surface water, and air because methylene chloride was contained at all times and the unit had a concrete containment system.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 13 Outdoor Off-Specification Product Storage Area

Conclusions: This unit is located on the south side of Building 509. The unit has a low potential for release to soil, groundwater, surface water, and air because the off-specification material is solid, no releases were documented from this unit, and the unit is underlain by an asphalt surface.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 14 Indoor Off-Specification Product Storage Area

Conclusions: This unit is located in the Ethafoam warehouse section of Building 504 in the Ethafoam plant. This unit was not observed during the VSI because of construction activities. The unit has a low potential for release to soil,

groundwater, surface water, and air because the unit is located indoors on a concrete floor, no releases were documented from this unit, and the off-specification material is solid.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 15 Two-Section Septic Tank System

Conclusions: This unit is located underground south of the main office building (Building 502) below the grassy area in front of the building. The tank is constructed of concrete.

On-Site Soil and Groundwater: There is a low potential for release of hazardous constituents to soil or groundwater from this unit because the septic system no longer receives process waters. From 1957 to 1976, the potential for releases of hazardous constituents to the subsurface was moderate because the septic system received process waters and was located underground.

Surface Water: There is a low potential for release of hazardous constituents to surface water from this unit because the unit is underground and because the second tank is routed to the Wastewater Treatment System (SWMUs 38-40).

Air: There is a low potential for past and ongoing releases to air from this unit because of its underground location.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 16 Solid Waste Dumpsters

Conclusions: This unit consists of solid waste Dumpsters located at various indoor and outdoor locations throughout the entire facility. The Dumpsters store nonhazardous wastes. The Dumpsters are underlain by either asphalt (outdoors)

or concrete flooring (indoors), and some have curbs and drains. The unit has no potential for release to soil, groundwater, surface water, and air because the waste is nonhazardous and the units are underlain by asphalt or concrete.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 17 Storm Water Drainage System

Conclusions: This unit surrounds and dissects the Styron plant. The system consists of natural clay gravel-lined ditches and grates. However, some parts of the system are natural drainageways along roads, with no lining. The sewer lines are made of concrete. Storm water collected in the unit is routed to the Wastewater Treatment System (SWMUs 38-40).

Soil and Groundwater: Storm water flowing through the ditches could contain hazardous constituents; therefore, there is a high potential for soil in the ditches and underlying groundwater to become contaminated.

Surface Water: There is a low potential for surface water contamination because all runoff is currently routed to the Wastewater Treatment System (SWMUs 38-40) before discharge to the Drainage Ditch to Big Thief Creek (SWMU 18).

Air: There is a low potential for release to air from this unit because of the dilute nature of the wastes.

Recommendations: Tetra Tech recommends collecting soil samples from the soil-lined drainage ditches to determine if hazardous constituents have been released. Sampling and analysis of storm water runoff from the ditches is also suggested.

SWMU 18**Drainage Ditch to Big Thief Creek****Conclusions:**

This unit receives treated process water and storm water runoff from the Wastewater Treatment System (SWMUs 38-40). In January 1988, a styrene spill occurred in the vicinity of the styrene storage tanks, but the spill was subsequently cleaned up and contaminated soil was removed. In 1989, a release of untreated process water from the former Aerated Skimmer Basin (SWMU 32) to the surface water in the Drainage Ditch to Big Thief Creek (SWMU 18) occurred. The pump in the basin was too small to offset an increase in the amount of process water from the Process Sewer System (SWMU 24). The estimated rate of discharge was about 1 gpm. The water was reportedly very oily and emitted a strong organic odor. There is a moderate potential for release to soil, groundwater, surface water, and air from this unit due to past releases to this unit.

Recommendations:

Tetra Tech recommends collecting soil samples from this unit specifically in the area where past releases have occurred.

SWMU 19**Drainage Ditch to North****Conclusions:**

This unit receives runoff from the northern part of the Styron plant. The water in the ditch is mostly storm water runoff. The unit has a low potential for release to soil, groundwater, surface water, and air because runoff to this unit is generated primarily from noncontact precipitation. A nearby acrylonitrile tank and the recycle organic tank farm have separate padding and diking to prevent runoff to the unit.

Recommendations:

Tetra Tech recommends no further action for this SWMU.

SWMU 20**Pellet Car Washing Area and Sump**

Conclusions: This unit is located in a covered building attached to the west side of Building 407. The unit is used to clean railcars after the removal of polystyrene. The unit has a low potential for release to soil, groundwater, surface water, and air because the wastewater, which is conveyed to the Wastewater Treatment System (SWMUs 38-40), is nonhazardous and the unit is located indoors.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 21**Forklift Washing Area and Sump**

Conclusions: This unit is located in the northeast corner of Building 50. The unit consists of concrete walls and floor. The area is used for cleaning forklifts. The unit has a low potential for release to soil, groundwater, surface water, and air because the unit is located indoors on a concrete pad and wastewater from the unit is conveyed to the Wastewater Treatment System (SWMUs 38-40).

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 22**Evaporative Cooling Tower – Styron Plant**

Conclusions: This unit is located on the southwest corner of Fifth and B Streets across from Process Boilers R1 and R3 (SWMU 10). The unit manages contact cooling water from the Styron Plant. The unit has a low potential for release to soil, groundwater, surface water, and air because the unit is located over a concrete pad and the waste constituents are reportedly present at very low concentrations.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 23**Former Evaporative Cooling Towers – Ethafoam Plant**

Conclusions: This unit was located north of Building 504 on a concrete pad. The contact cooling water may have contained catalysts or blowdown agents. During the unit's operation, it had a low potential for release to soil, groundwater, surface water, and air because the unit was located on a concrete pad and the cooling water blowdown was discharged directly to the Process Sewer System (SWMU 24). The unit was also closed to the atmosphere. The unit was removed in 1992. Currently, there is no potential for release to soil, groundwater, surface water, and air because the unit no longer exists.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 24**Process Sewer System**

Conclusions: This unit is located underground and accepts drainage from the forklift washwater, pellet car washwater, cooling tower and boiler blowdown, and storm water. The integrity of the sewer system is unknown. A 235-foot-long section of the process sewer line and contaminated soil were removed and replaced in 1997.

On-Site Soil and Groundwater: The potential for release to soil or groundwater from this unit cannot be evaluated because the integrity of the sewer system is unknown.

Surface Water: The unit has a low potential for release to surface water because the process water is conveyed to the Wastewater Treatment System (SWMUs 38-40) prior to discharge to the Drainage Ditch to Big Thief Creek (SWMU 18).

Air: There is a low potential for releases to air from this unit because it is underground.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMUs 25-28 Former Wastewater Treatment System

Conclusions: This unit was located underground and consisted of an Aerator (SWMU 25), a Clarifier (SWMU 26), a Chlorinator (SWMU 27), and two Tertiary Filters (SWMU 28). Water routed to the treatment system likely contained ethylbenzene, styrene, acrylonitrile, oil, dirt, solvents, and foam particles.

On-Site Soil and Groundwater: There is no potential for release to soil and groundwater because the unit no longer exists and no spills or releases were documented.

Surface Water: During the unit's operation, it had a moderate potential for release to surface water because of its proximity to the Drainage Ditch to Big Thief Creek (SWMU 18) and because it had no overflow controls.

Air: The unit also had a low to moderate potential for release to air during its operation because it was open to the atmosphere. Currently, there is no potential for release to surface water and air because the unit no longer exists.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 29 Former Used Filter Sand Pile

Conclusions: This unit was located southeast of the Former Hazardous Waste Storage Area (SWMU 4). Used filter sand was stored on the ground and may have contained hazardous constituents such as ethylbenzene and styrene.

On-Site Soil and Groundwater: During the unit's operation, it had a moderate potential for release to soil and groundwater because filter sand was fairly

volatile and the unit was located on the ground. Some leaching may have occurred.

Surface Water: The unit had a low potential for release to surface water because of its distance to surface water. Currently, there is no potential for release to surface water and air because the unit no longer exists.

Air: This unit had a moderate potential for release to air because the filter sand was fairly volatile and the unit was open to the atmosphere. Currently, there is no potential for release to surface water and air because the unit no longer exists.

Recommendations: Tetra Tech recommends soil sampling in the vicinity of the former sand pile to determine if the unit has impacted on-site soil.

SWMU 30 Former Well Water Treatment Backflush Sump

Conclusions: This unit is located in Building 409, which is also the site of the well water treatment system. This backflush, which may have contained filter sand and salt, was discharged directly to the Former Fire Pond (SWMU 31). During its operation, the unit had no potential for release to soil, groundwater, surface water, and air because the backflush was nonhazardous.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 31 Former Fire Pond

Conclusions: This unit was located in the northwest corner of the intersection of Fifth and E Streets. The pond had a 2-foot-high berm with a rubber liner and a packed clay floor. Available information indicates that a portion of the pond intersected the underlying sand and gravel aquifer. During its operation, the unit had a high potential for release to soil and groundwater because the bottom of the pond extended into the sand and gravel aquifer and the permeability of the compacted

clay layer bottom was unknown. The unit also had a high potential for release to surface water because water in the pond contained some hazardous constituents. The pond water was discharged directly into the Drainage Ditch to Big Thief Creek (SWMU 18). The unit also had potential for release to the air because the unit was open to the atmosphere. However, the pond underwent closure in 1996; therefore, there is no potential for ongoing or future releases to soil, groundwater, surface water, and air.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 32

Former Aerated Skimmer Basin

Conclusions: This unit was located southwest of the Wastewater Treatment System (SWMUs 38-40) and received untreated process water from the Process Sewer System (SWMU 24). This water reportedly contained small amounts of several hazardous constituents, such as ethylbenzene, styrene, acrylonitrile, and solvents, as well as oil and dirt. During the 1989 VSI, a release of untreated process water to the surface water Drainage Ditch to Big Thief Creek (SWMU 18) occurred. The pump in the basin was too small to offset an increase in the amount of process water from the Process Sewer System (SWMU 24). The estimated rate of discharge was about 1 gpm. The water was reportedly very oily and emitted a strong organic odor. During its operation, the unit had a high potential for release to soil, groundwater, surface water, and air because the basin was designed to allow untreated overflow to discharge directly into the Drainage Ditch to Big Thief Creek (SWMU 18). The unit was also open to the atmosphere. Currently, there is no potential for ongoing or future releases from the unit because the unit was removed in 1992 along with the Former Wastewater Treatment System (SWMUs 25-28).

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 33**Dowtherm Satellite Accumulation Areas**

Conclusions: The unit is located throughout the Styron plant in 55-gallon drums. The areas are used on an as needed basis, and their locations apparently vary with time. The unit has a low potential for release to soil, groundwater, surface water, and air because the drums are covered and underlain by a concrete pad. The Dowtherm is reportedly a nonvolatile oil.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 34**Dike and Sump System for Runoff and Spill Collection**

Conclusions: This unit receives runoff and spills from storage tanks and boilers. The runoff and spill water may contain ethylbenzene, styrene, acrylonitrile, oil, Dowtherm, and solvents. The unit has a low potential for release to soil, groundwater, surface water, and air because the dikes and sumps are designed to prevent releases from occurring and the unit appeared to be in good condition at the time of the VSI.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 35**Recycle Styrofoam Cooling Bath**

Conclusions: This unit is located in Building 532. The bath trough is made of steel. The unit manages contact cooling water that may contain small amounts of ethylbenzene, styrene, and blowing agents.

On-Site Soil and Groundwater: The unit has a low potential for release to soil and groundwater because the unit is underlain by a concrete floor and blind sump.

Surface Water: The unit has a low potential for release because the cooling water is bled to the Process Sewer System (SWMU 24).

Air: The unit has a low potential for release to air because it is indoors.

Recommendations: Tetra Tech recommends no further action for this SWMU.

SWMU 36

Former 250-Gallon Pressurized Storage Tanks

Conclusions: This unit consisted of about 20 250-gallon pressurized tanks located throughout the Styron plant and used to store liquid wastes. During its operation, the unit was reportedly in good condition, and no releases were documented from this unit. The potential for release to soil, groundwater, surface water, and air from this unit is low. During the VSI, two tanks containing solid polymerized styrene were identified near Building 401. Tetra Tech personnel could not determine how long the tanks had stored this material.

Recommendations: Tetra Tech recommends removing and properly disposing of the material in the tanks.

SWMU 37

Fire Protection Collection Basin

Conclusions: This unit consists of a concrete basin located north of the Wastewater Treatment System (SWMUs 38-40). The unit receives untreated process water from the Process Sewer System (SWMU 24). This water contains several hazardous constituents, such as ethylbenzene, styrene, acrylonitrile, and solvents, as well as oil and dirt. The unit has a low potential for release to soil, groundwater, surface water, and air because the basin is made of concrete and has a pump to transfer water from the basin to the Wastewater Treatment System (SWMUs 38-40).

Recommendations: Tetra Tech recommends no further action for this SWMU.

Conclusions:

This unit consists of three separate units, an Aerator System (SWMU 38), a Clarifier (SWMU 39), and a Tertiary Sand Filter System (SWMU 40). The unit treats process and septic water and storm water runoff. Wastewater routed to the unit likely contains ethylbenzene, styrene, acrylonitrile, oil, dirt, solvents, and foam particles. No spills or releases were documented from this unit, and it appeared to be in good condition at the time of the VSI. The unit has a low potential for release to soil, groundwater, surface water, and air because the system is underlain by a concrete pad with a sump to contain spills. The sump routes spills to the system to be reprocessed.

Recommendations:

Tetra Tech recommends no further action for this SWMU.

TABLE 3
SWMU SUMMARY

	<u>SWMU</u>	<u>Dates of Operation</u>	<u>Evidence of Release</u>	<u>Recommended Further Action</u>
- 1.	Former Flaring Pad	1957 to 1968	No releases were documented from this unit.	No further action
2.	Former Waste Pile	1957 to 1965	No releases were documented from this unit.	No further action
3.	Former Hazardous Waste Storage Areas - Styron Plant	1974 to 1980	No releases were documented from this unit.	No further action
4.	Former Hazardous Waste Storage Area	1979 to 1982	Between 1978 and 1980, about 50 gallons of styrene, ethylbenzene, and partially polymerized polystyrene were released.	Underwent closure in 1996; no further action
5.	Hazardous Waste Storage Area	1982 to present	In 1987, waste poured from a 14-gallon drum to the storage area floor.	Dow responded by cleaning up the waste the same day; no further action
6.	Hazardous Waste Container Loading Area	1974 to present	No releases were documented from this unit.	No further action
- 7.	Former Roadside Staging Area	February 1987 to June 1987	No releases were documented from this unit.	No further action
- 8.	Former Waste Fuel Storage Tanks	1979 to 1990	No releases were documented from this unit.	No further action
- 9.	Hazardous Waste Fuel Storage Tank	1977 to present	According to facility representatives a release from this unit has not occurred. However, a document titled "RCRA Part B Permit Application for BIF Units" refers to a 7,900-pound spill that reportedly occurred at this unit in 1997.	No further action
10.	Process Boilers R1 and R3	R1: 1976 to present R3: 1968 to present	No releases were documented from this unit.	No further action
- 11.	Satellite Accumulation Area - Ethafoam Plant	1957 to present	No releases were documented from this unit.	Repair cracks in concrete pad
- 12.	Former Methylene Chloride Cleaning Tank	1983 to 1993	No releases were documented from this unit.	No further action
13.	Outdoor Off-Specification Product Storage Area	Unknown to present	No releases were documented from this unit.	No further action
14.	Indoor Off-Specification Product Storage Area	Unknown to present	No releases were documented from this unit.	No further action

TABLE 3 (Continued)

SWMU SUMMARY

	SWMU	Dates of Operation	Evidence of Release	Recommended Further Action
15.	Two-Section Septic Tank System	1957 to present	No releases were documented from this unit.	No further action
16.	Solid Waste Dumpsters	1957 to present	No releases were documented from this unit.	No further action
17.	Storm Water Drainage System	1957 to present	No releases were documented from this unit.	Soil sampling of unlined drainage ditches and storm water runoff sampling in the ditches
18.	Drainage Ditch to Big Thief Creek	1957 to present	In 1988, a styrene spill occurred in the drainage ditch, but it was remediated. In 1989, untreated process water from the SWMU 32 was released to the drainage ditch.	Soil sampling in the drainage ditch in the vicinity of the past releases
19.	Drainage Ditch to North	1957 to present	No releases were documented from this unit.	No further action
20.	Pellet Car Washing Area and Sump	Unknown to present	No releases were documented from this unit.	No further action
21.	Forklift Washing Area and Sump	Unknown to present	No releases were documented from this unit.	No further action
22.	Evaporative Cooling Tower - Styron Plant	1968 to present	No releases were documented from this unit.	No further action
23.	Former Evaporative Cooling Towers - Ethafoam Plant	1962 to 1992	No releases were documented from this unit.	No further action
24.	Process Sewer System	1964 to present	A 235-foot section of the sewer line and contaminated soil were removed and replaced in 1997.	No further action
25-28.	Former Wastewater Treatment System	1976 to 1992	No releases were documented from these units.	No further action
29.	Former Used Filter Sand Pile	Unknown to 1992	No releases were documented from this unit.	Soil sampling in the vicinity of the former sand pile
30.	Former Well Water Treatment Backflush Sump	Unknown to 1992	No releases were documented from this unit.	No further action
31.	Former Fire Pond	1966 to 1996	No releases were documented from this unit.	No further action
32.	Former Aerated Skimmer Basin	1976 to 1992	During the 1989 VSI, untreated process water released to surface water in SWMU 18.	No further action

TABLE 3 (Continued)

SWMU SUMMARY

	SWMU	Dates of Operation	Evidence of Release	Recommended Further Action
33.	Dowtherm Satellite Accumulation Areas	1968 to present	In 1987, a small fire occurred near the process boilers that was reportedly related to a Dowtherm spill.	No further action
34.	Dike and Sump Systems for Runoff and Spill Collection	1968 to present	No releases were documented from this unit.	No further action
35.	Recycle Styrofoam Cooling Bath	1957 to present	No releases were documented from this unit.	No further action
36.	Former 250-Gallon Pressurized Storage Tanks	Unknown to 1995	No releases were documented from this unit.	Remove and properly dispose of material in the two tanks identified during the VSI
37.	Fire Protection Collection Basin	1992 to present	No releases were documented from this unit.	No further action
38-40.	Wastewater Treatment System	1992 to present	No releases were documented from these units.	No further action

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- OEPA. 1994c. "Complaint and Compliance Order." From Norman Niedergang, OEPA Associate Division Director for RCRA. To C.T. Corporation System. October 31.
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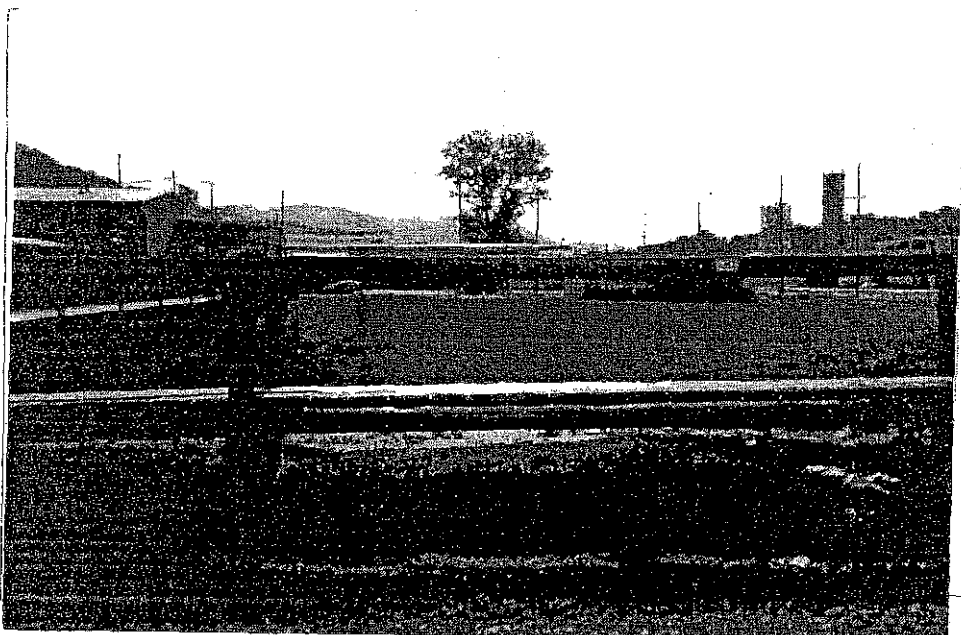
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Quadrangle.

APPENDIX A

VISUAL SITE INSPECTION SUMMARY AND PHOTOGRAPHS

(14 Pages)

(Note: The photographs in this photographic log are numbered to match their order of discussion in the text of the report; for this reason, the photograph numbers and descriptions may not correspond with the numbers and descriptions in the field notes [Appendix B]. Also, some photographs mentioned in the field notes do not appear in this photographic log.)



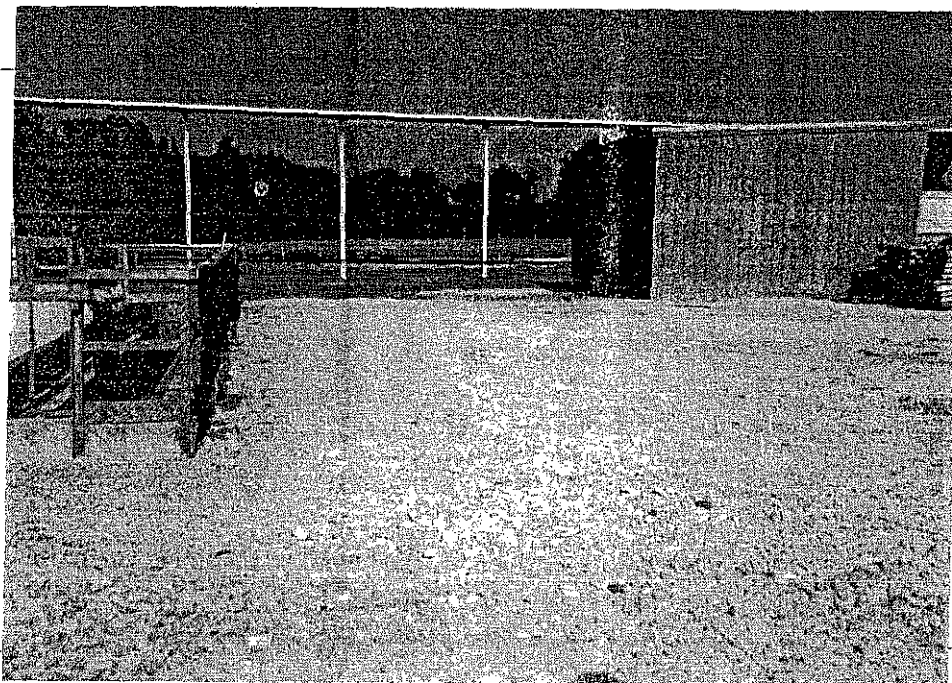
Photograph No. 1

Location: SWMUs 2 and 31

Orientation: East

Date: May 5, 2000

Description: Grassy area in background where Former Waste Pile (SWMU 2) and Former Fire Pond (SWMU 31) were located.



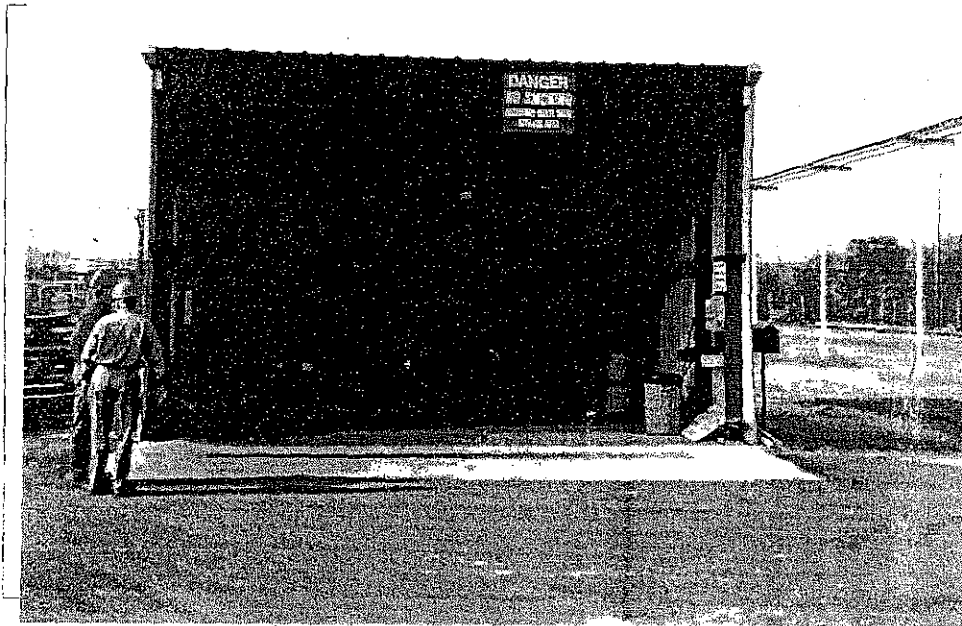
Photograph No. 2

Location: SWMUs 4 and 5

Orientation: West

Date: May 5, 2000

Description: Green sheet metal building where Hazardous Waste Storage Area (SWMU 5) is located and grassy area in background where Former Hazardous Storage Area (SWMU 4) was located.



Photograph No. 3

Orientation: South

Description: Hazardous Waste Storage Area with sump in foreground and 55-gallon drums on wooden pallets in background

Location: SWMU 5

Date: May 5, 2000



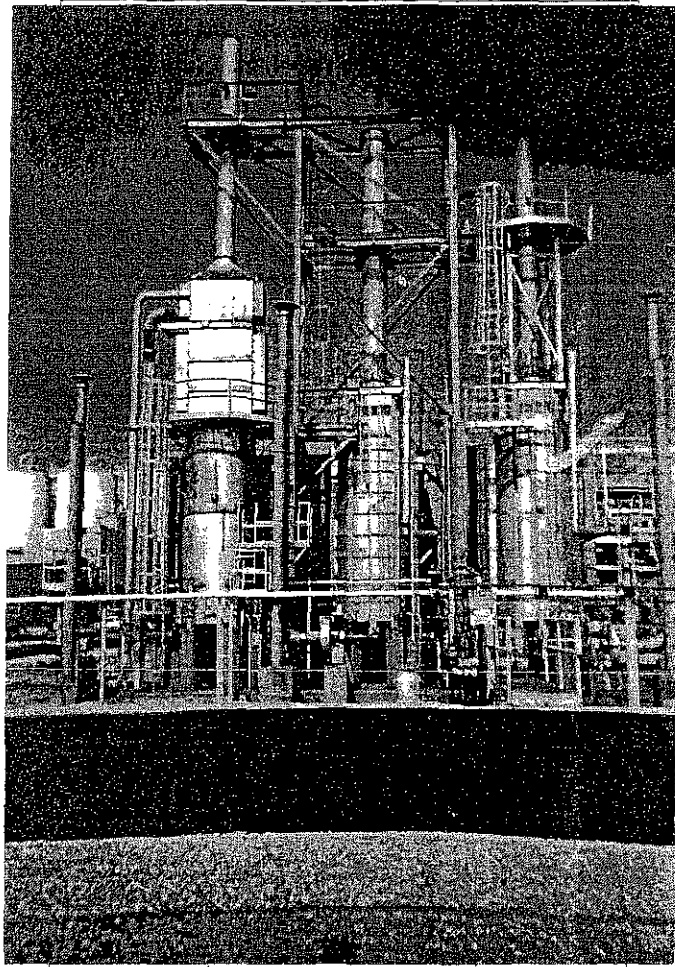
Photograph No. 4

Orientation: Northwest

Description: Hazardous Waste Container Loading Area building and loading dock in background and driveway in foreground

Location: SWMU 6

Date: May 5, 2000



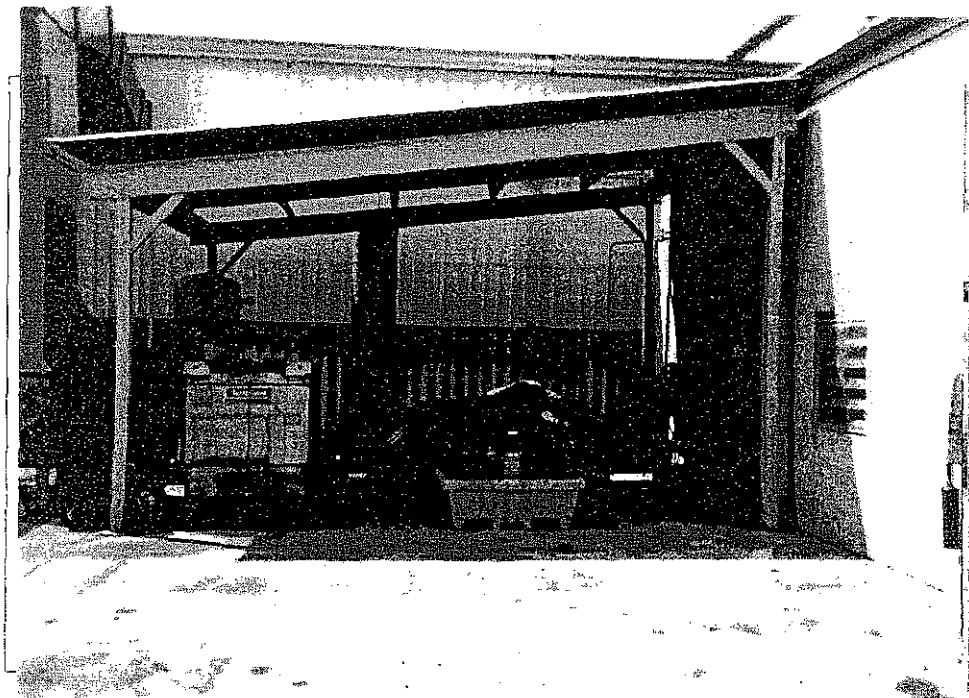
Photograph No. 6

Orientation: West

Location: SWMU 10

Date: May 5, 2000

Description: Process Boiler R1 on far left and Process Boiler R3 on far right; Process Boiler R2, located between R1 and R3, burns natural gas only



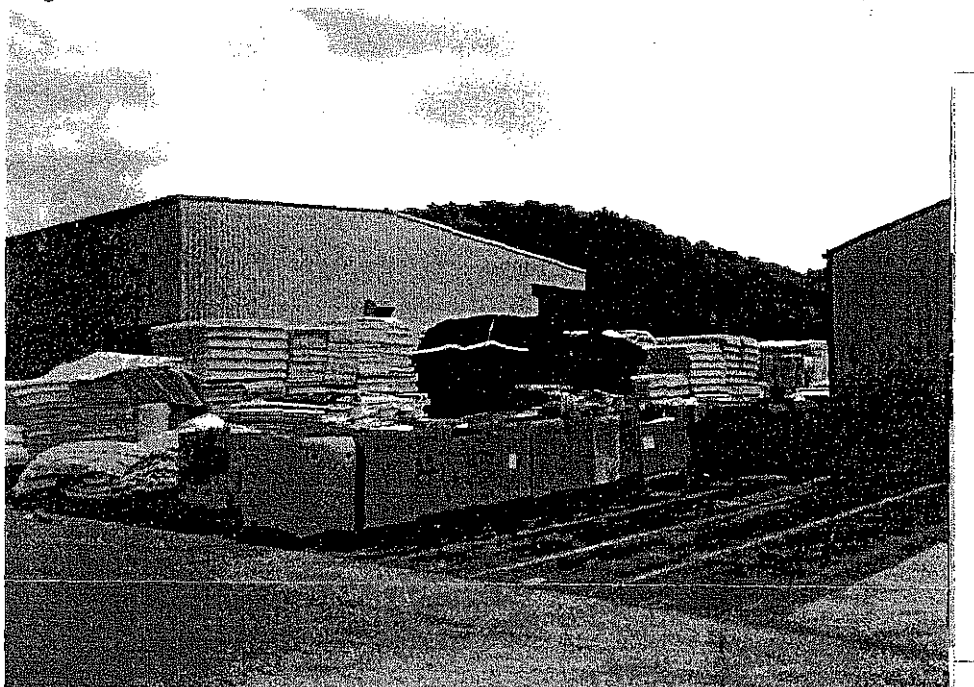
Photograph No. 7

Orientation: South

Location: SWMU 11

Date: May 5, 2000

Description: Satellite Accumulation Area - Ethafoam Plant with sloped roof and concrete pad; Note staining on floor.



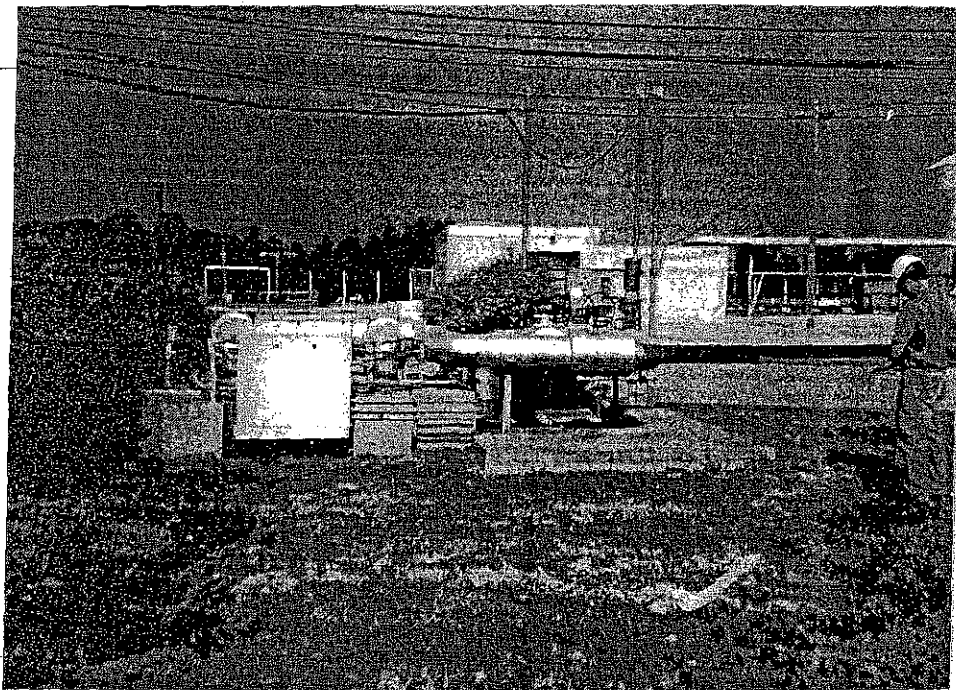
Photograph No. 8

Orientation: Northeast

Location: SWMU 13

Date: May 5, 2000

Description: Outdoor Off-Specification Product Storage Area containing off-specification Ethafoam outside Building 509



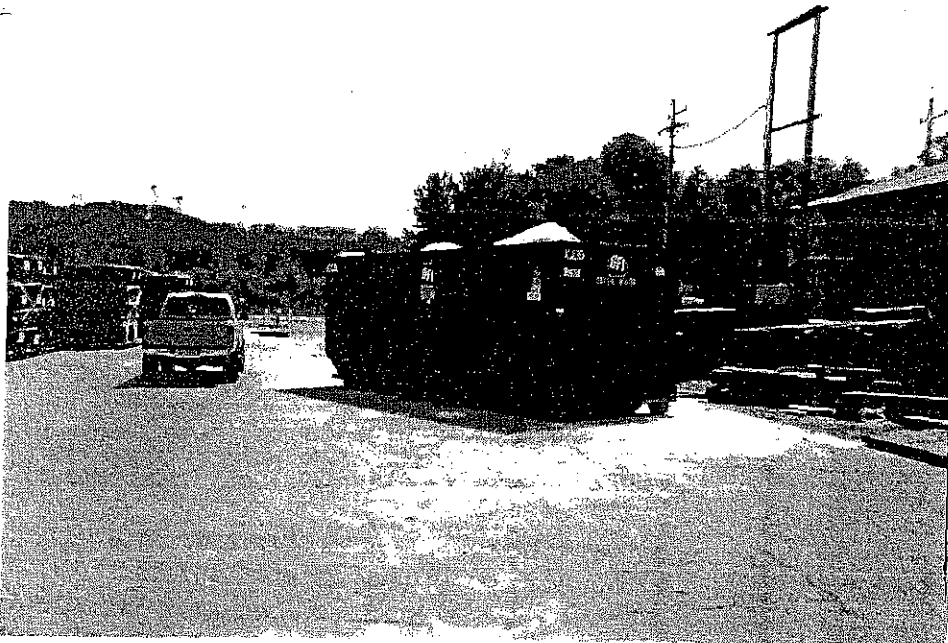
Photograph No. 9

Orientation: West

Description: Two-Section Septic Tank System in grassy area near main office building

Location: SWMU 15

Date: May 5, 2000



Photograph No. 10

Orientation: East

Description: Solid Waste Dumpster located behind Building 531

Location: SWMU 16

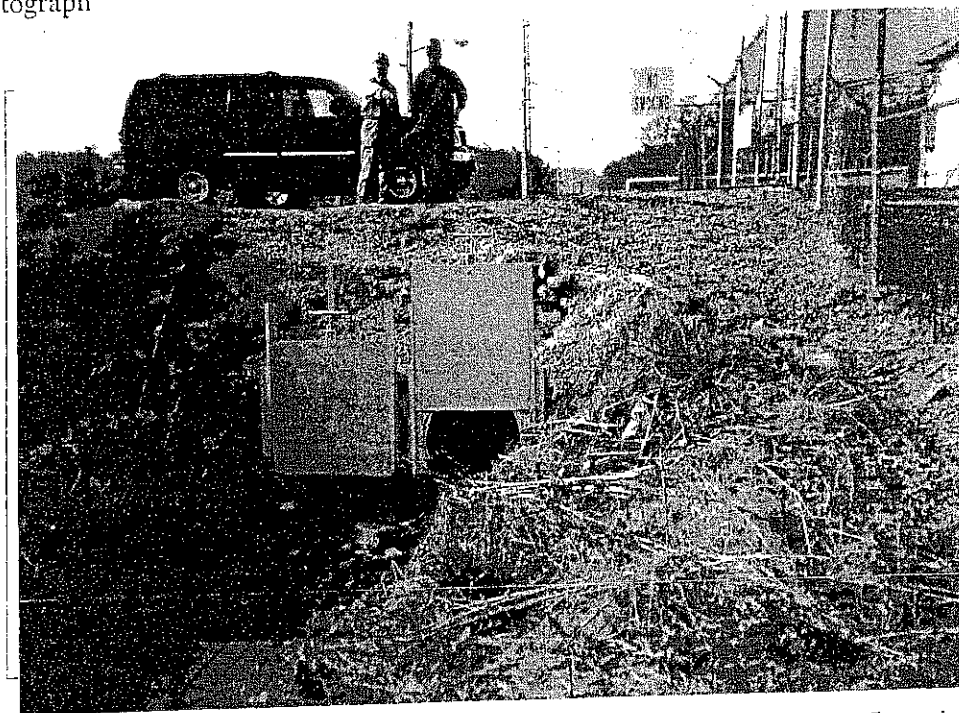
Date: May 5, 2000



Photograph No. 11
Orientation: Southeast

Location: SWMU 17
Date: May 5, 2000

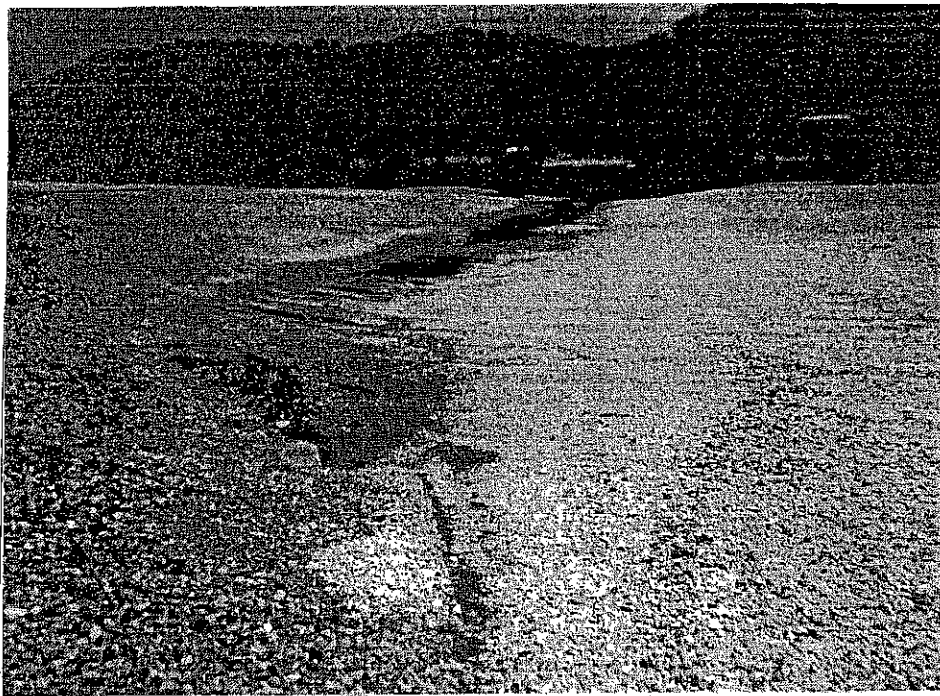
Description: A section of the Storm Water Drainage System with steel grate cover on left side of photograph



Photograph No. 12
Orientation: South

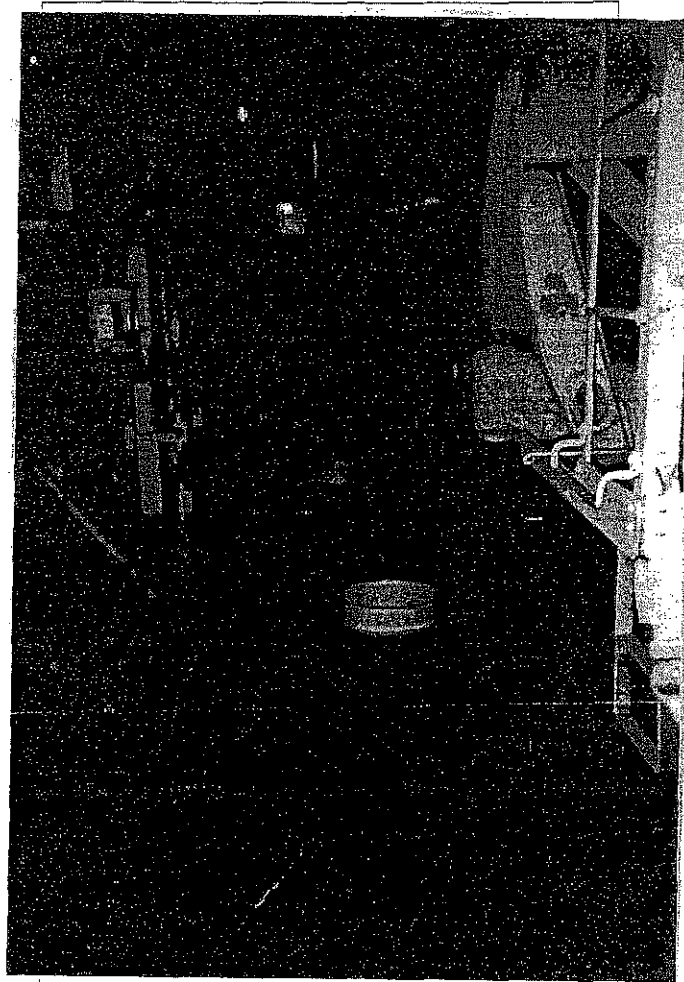
Location: SWMU 18
Date: May 5, 2000

Description: Drainage Ditch to Big Thief Creek with slide gate valves



- ✓ Photograph No. 13
- ✓ Orientation: Northwest
- ✓ Description: Drainage Ditch to North with sandy sediment

Location: SWMU 19
Date: May 5, 2000



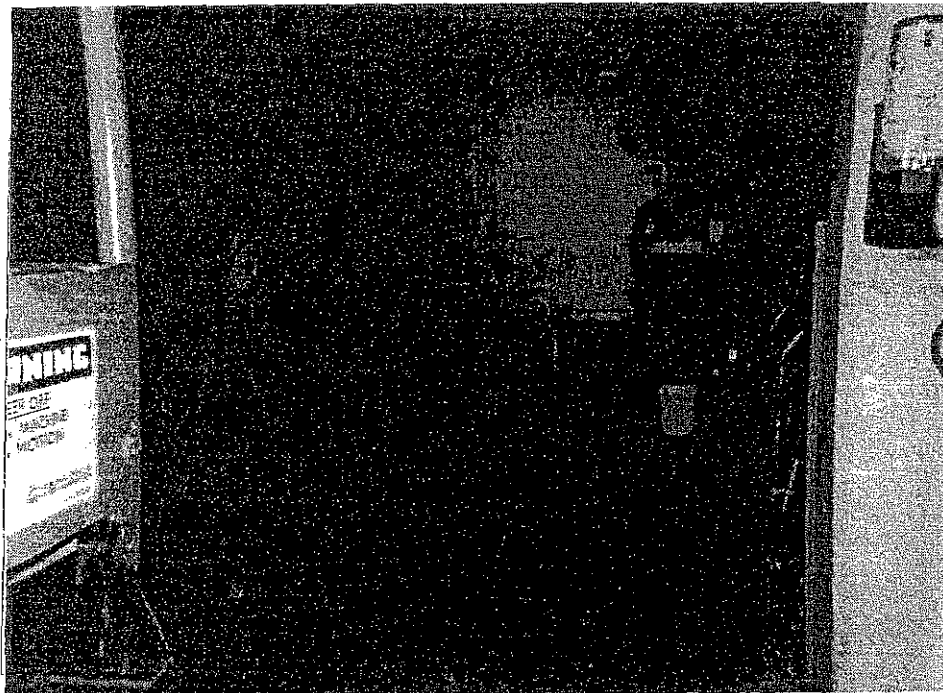
Photograph No. 14

Orientation: North

Description: Pellet Car Washing Area and Sump; sump to the left and railcar to the right

Location: SWMU 20

Date: May 5, 2000



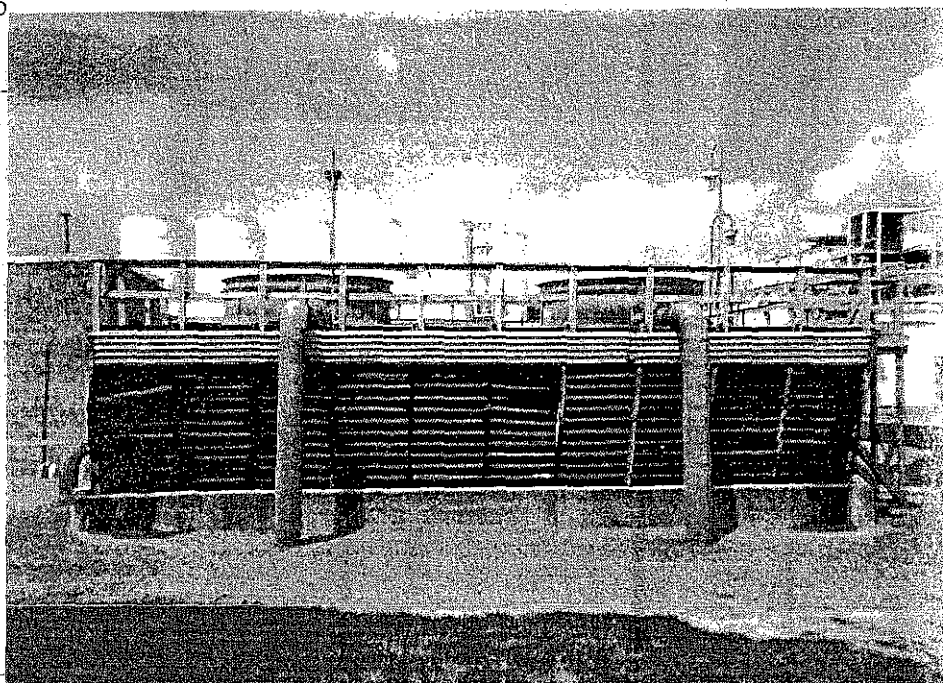
Photograph No. 15

Orientation: West

Description: Forklift Washing Area and Sump, where staining was observed on concrete floor around sump

Location: SWMU 21

Date: May 5, 2000



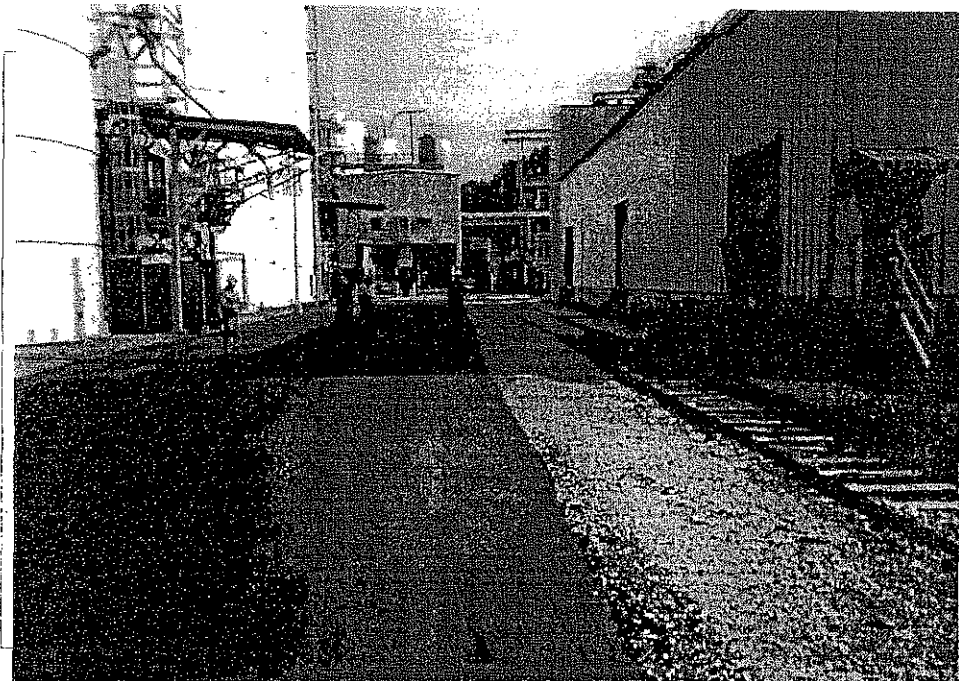
Photograph No. 16

Orientation: West

Description: Evaporative Cooling Tower - Styron Plant on concrete pad

Location: SWMU 22

Date: May 5, 2000



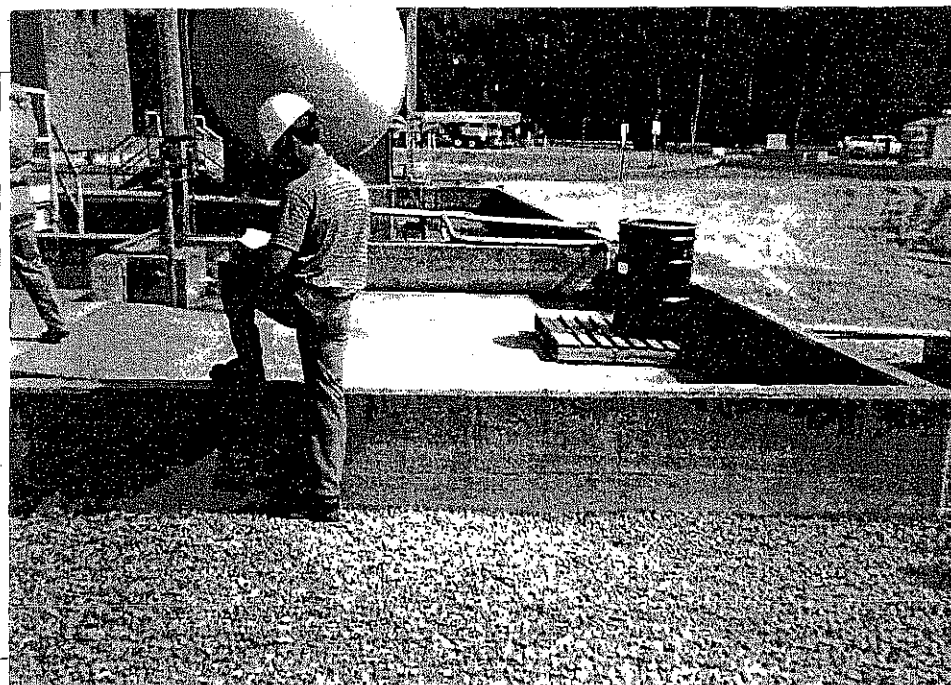
Photograph No. 17

Orientation: North

Description: Location of underground Process Sewer System, which runs under the pavement and parallel to the railroad tracks

Location: SWMU 24

Date: May 5, 2000



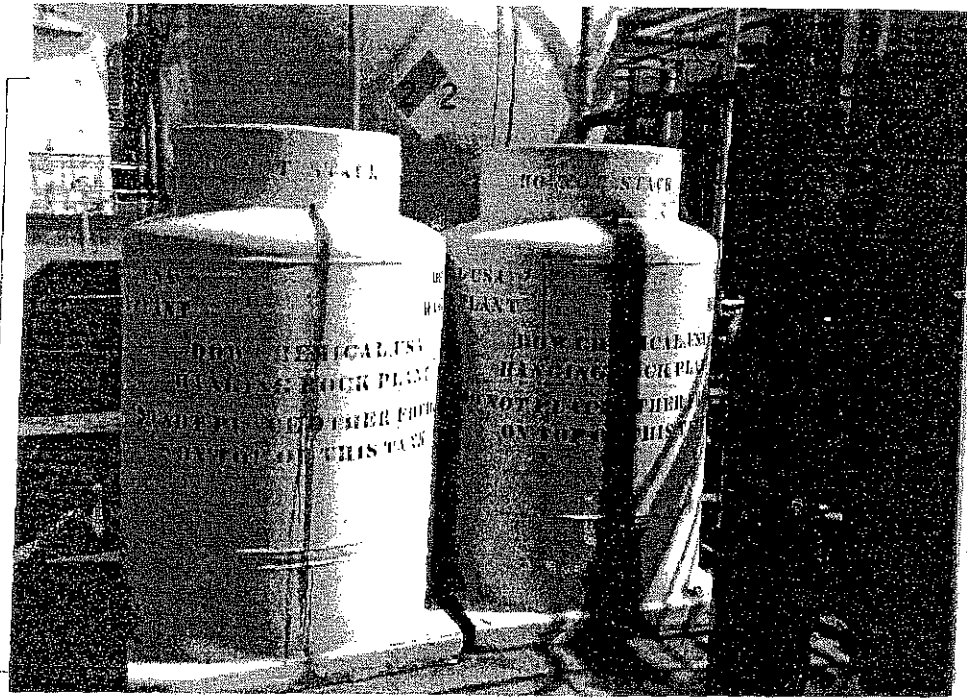
Photograph No. 18

Orientation: North

Description: 3-foot-high concrete dike of Dike and Sump System for Runoff and Spill Collection sump used to contain raw material storage tank

Location: SWMU 34

Date: May 5, 2000



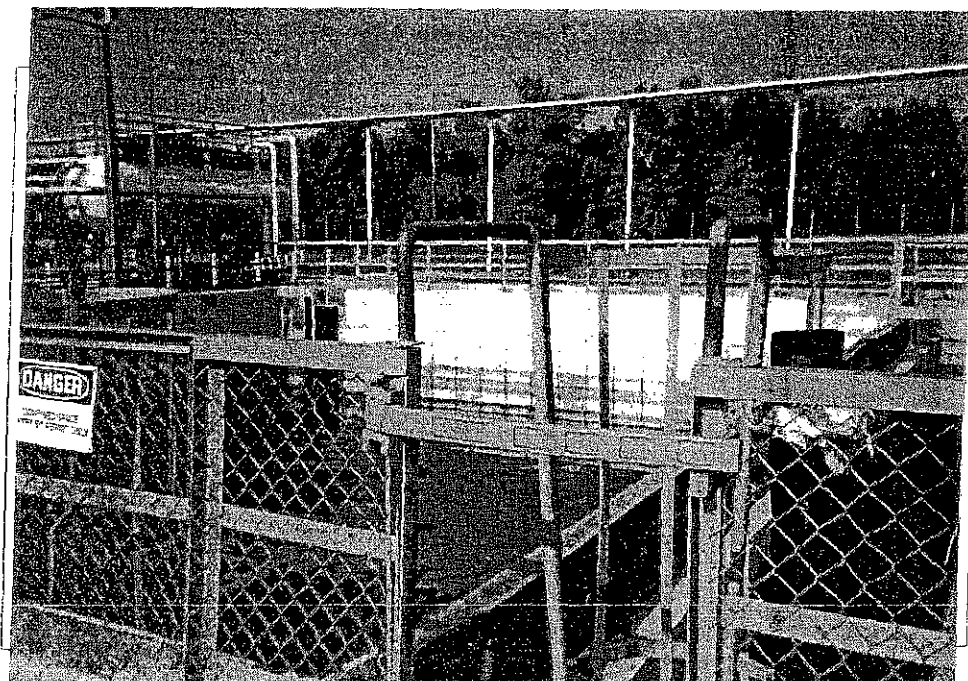
Photograph No. 19

Orientation: North

Location: SWMU 36

Date: May 5, 2000

Description: Two 250-Gallon Pressurized Storage Tanks containing solid polymerized styrene



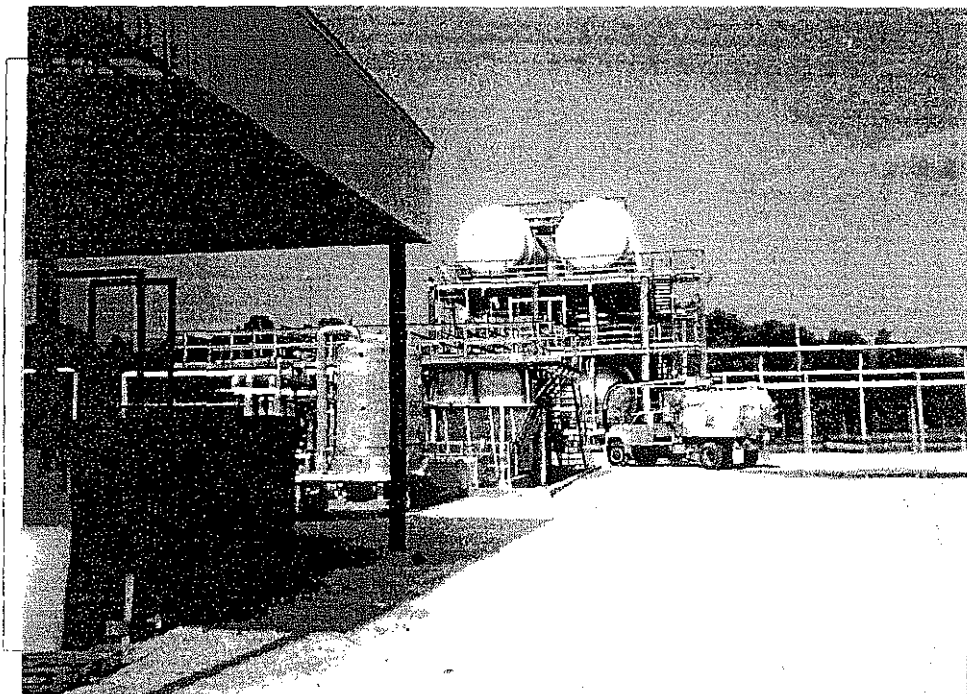
Photograph No. 20

Orientation: Southwest

Location: SWMU 37

Date: May 5, 2000

Description: Fire Protection Collection Basin containing process water from Process Sewer System
(SWMU 24)



Photograph No. 21
Orientation: West
Description: Entire Wastewater Treatment System

Location: SWMUs 38-40
Date: May 5, 2000

APPENDIX B

VISUAL SITE INSPECTION FIELD NOTES

(Five Sheets)

5/4/00

Dow Chemical VSI⁷

The site located in Trumbull, OH is
surrounded predominantly by farmland
on old US Rt. 52 1A.

- Weather conditions: sunny, clear temp. VSP

1900 Stan Lynn & Dave Kemley, Tetra
Tech arrive on site and meet w/ Dennis
Stanley, Troy DeHoff

- 3 mfg units, sty reform unit / ethylam
unit / polystyrene ABS plant - history
of each unit provided by D. Stanley - see D.
Kemley notes.

- BTR units summarized.

- most wastes assoc. w/ polystyrene plant

- most cut/piece removed goes out ditch to
Big Thicket eventually discharging to
Ohio R. (NPDES outfall) ~~cool~~ process
outfall / 2 stormwater outfalls

raw material

3 storage tanks: 1 contain styrene
1 contain Acetone ABS recycled - material

not used in process goes Texas Styrene
Plant - Dow site.

- See Dave's notes.

5/4/00

Installed 9/1/83

Previous

New WWT - replaces SWMS

31-35 → diked system / generate of generation ~ 12 gpm of combined W.W. / stormwater

- Dow Chemical property - 536 acres (buy up 350 acres surrounding plant to make room for expansion). Plant currently occupies ~ 100 acres, remainder undeveloped

Polyethylene 1) Synthane mfg. unit

2) Chloroform mfg. unit

3) polystyrene / ABS (acrylonitrile, butadiene, styrene)

- Processes hazardous much since 1989. PAUST

- Ethylbenzene 3 storage units

- 2 BTL units

- Less than 3000 storage for 192 waste

Most waste generated from polystyrene operation

- Fire pump hydrocarbon storage - 1000 gal

2 outfalls (NUPs) - most go to Big Three Perennial

near storage pipeline / storage along Ohio R

- other outfall loc. NW portion of facility - for

Extruded

3000000 lb. train in polystyrene / ABS unit (traditional

5/4/90

Chemical plant

Raw materials, styrene, ethylbenzene in addition to raw materials listed in 1989 PAUST facility also use hydrogen fluoride

- According to facility rep, HIPS listed in 1989 PAUST, it is no longer used in the general process for the styrene plant

- According to facility rep, the major 1989 wastes generated are extruded characteristic hpc wastes including DOW E DIB

- Some liquid wastes are stored in 55-gal drums at various 549 accumulation areas before being transported to the R-15 hpc waste storage tank of 1000 gal

waste storage area

- Currently, it set accumulation areas for DOW E DIB wastes

Air permit in 1989, PAUST operates

- No air permit for Ethanol process before not used

Process permit synopolatic

for 85440000 P004 - P019, P021, and P015 added

Raw material storage tank added

- add T008 - 142 V103 tank

T009 - 142 V101 P015 tank

T008 - 142 V101 P015 tank

5/4/00

According to Dwyer, facility generated ~1,400,000 pounds of Dioxin and Diox wastes in 1999.

- Active haz. waste fuel storage tank (K-35) is ~10,000 gal. capacity.

- About 1,000,000 gallons of Diox/Diox by-product fuel was burned in 1999.

- Some of this waste is also picked up by Solidity Klen and transported to Bridgeport, NJ for incineration.
- 1999 states ventilation containing organic vapors are occasionally generated in storage tanks (UO89) and stored in U50-99. Press. tanks. According to app. material, polymerized wastes spilled which have happened for several yrs. - only 2 press. tanks identified during 1999 containing polymerized styrene, propyl, methylphenyl chloride cleaning tank identified in 1989.
- As Suman 17 is no longer used. According to app. tank (above ground) was removed 4 yrs. ago and placed in tanks - which have been used. Currently, low hydrocarbons present off equip.
- Dioxin containers captured areas no longer used.
- Dioxin eliminated from process.
- Active vapors of
- Waste water is treated on site using the current wastewater treatment system (sized for 24 gpm)
- see flowchart for treatment process.

5/4/00

- Evaporative cooling towers (Suman 28, 29) for Ethanol plant are no longer used (removed in 1991) and currently are set aside for cooling.

- Sand filter from current WTP goes to Green Valley 1998 still in Smithfield, KY.

* Reviewed sums identified during 1989 UST and current status:

Suman 1 - former Flaming Dam - current

Suman 2 - former waste pile - current

Suman 3 - former haz. waste container storage area

Remediated in 1997/1998 removed, storage tank, line

of contaminated - soil sampling achieved closure.

Suman 4 - former haz. waste container storage area - remediated in 1997.

Suman 5 - former haz. waste container storage area - current - active haz. Dioxin is added.

Suman 6 - haz. waste container loading area - current

Suman 7 - former Dioxin storage area - current

Suman 8 - former waste fuel storage tank - remediated

in 1990, stored clay forms / concrete - no formal

closure doc.

Suman 10 - active haz. waste fuel storage tank - open

lined recently, 10,000 gal.

Suman 11 - 13 - process cooling tanks - R-2, R-3 - current

status 5/8/00

0800

5/5/6

- 1. Dave R. and Stan L. Terra Tech meet w/ Dow Chemical personnel. Troy DeHoff and Dennis Stanley to continue discussing status of SUMMIS and AOCs from 1989 PAUSE. Also, following the discussion we will perform VST and take photos. Dow requested duplicate copies of the photos for their records.
- Weather conditions: moderately cloudy, temp. ~ 65°F.
- Continued discussion SUMMIS.
- 1 SUMMIS: temp. used explosion storage area: purifier based / purifier system for electrolyte system - Peroxide
- 1 NON-haz. waste - new system haven't had to dispose
- 1 OP peroxide waste yet - Peroxide, unknown
- 1 SUMMIS: Satellite container storage area. According to temp., area no longer used for storage / data storage.
- 1 DOW: 250-gal. press tank no longer.
- 1 SUMMIS: Satellite container storage area - Ethanol tank - current.
- SUMMIS: 17: Methylene Chloride Cleaning Tank; tank removed, and replaced with nitrogen but not used for hydroblasting. used to clean only.

5/5/6

- SUMMIS: outdoor off-spec product storage area - in 1989 area outside bldg. 408 used for off-spec storage / new off-spec storage area loc. here during current VST / however, off-spec outdoor idling in outside bldg. 509 (some materials).
- SUMMIS: indoor off-spec product storage area, according to rep. area still used for product storage (off-spec) however, unable to access area due to construction around entrance.
- SUMMIS: two section separator tank, currently, routed to new wastewater treatment system - wastewater treatment process from storm drain - compact cooling water only. According to rep. it does not come in to contact w/ haz. constituents in 1989.
- SUMMIS: solid waste dumpsters - current - located throughout the site.
- SUMMIS: stormwater drainage system - drainage goes to process area, to 500 Fire Protection Collection System (new SUMMIS) (250,000 gal. - installed in 1990) to new VSTP to Big Pipe St.
- Oil / water separator in 500 system pump, with 55-gal. drums to Big Pipe Near 3 to 4 drums / yr. in collection.

John S. 12 41
 (continued)

NPDES 001/601

5/5/00

- 1 0900 Began site visit with plant personnel and observe all SWMS and former SWMS and AOCs.
- Photo 1: SWMS drainage ditch to Big Thief Creek, facing south showing gate to contain any spills; -outfall 001.
- Photo 2: AOC - A former styrene spill area at main styrene pump farm, showing off-can pump (fully contained) w/ clay liner beneath and asking for sec. containment, facing south.
- Photo 3: Facing S., Current haz. waste storage area, sloped, w/ collection sump covered area - SWMS.
- Observed former hazardous storage tanks, removed in 1990.
- Photo 4: Facing N., Process Sewer line below the pavement ditch in line w/ sewer lids on ground surface - SWMS 30.
- Photo 5: S700 Collection system where process water collects from process sewer system to NEW WWTTP, facing SW - new SWMS.
- Photo 6: New S700 system, photo of former haz. waste container storage area and old drum

5/5/00

- Storage Area - remediated in 1997, - former SWMS 354 - facing west.
- Photo 7: said collection tanks / reactor for NEW WWTTP, showing concrete, SWMS 171, SWMS 172.
- Photo 8: Facing S., bio-reactor for WWTTP w/ concrete burners, containment, carbon filters.
- Photo 9: WWTTP sand filter system for NEW WWTTP facing south, all appeared to be in good condition. - New SWMS 171A - no drums are used for disposal of sand buried daily, 1500.
- various drums notes.
- Photo 10: Facing north, facing east.
- Photo 11: former fire and acid - old SWMS 138.
- Facing east.
- Photo 12: Facing west, entire WWTTP.
- Photo 13: Facing west, fine suction siphon tank system, old tanks removed.
- Photo 14: G.W. filtration system for system water.
- 15: w/ carbon for lamp gas processing, operations - fine protection water / coded in tower goes through reverse osmosis and treated w/ sodium hypochlorite in bldg 40 of Boiling SWE.
- Photo 15: Outfall 801 in bldg 904

5/1/00

Photo 18: Process boilers R1, R2, and R3/R1 and R3 contain haz. waste, R1 bands not gas only. Facing west, sec. containment - 4" concrete berm separates govt to camp for WWT. pumped

Photo 18: New SWMU - satellite area for haz. waste storage tank R35, drum identified in area 1' berm w/ SWMU, some drums identified in concrete, facing N. acrylonitrile on drum

Photo 19: Haz. waste storage tank for boilers to, oregol. cap. SWMU 10. - epoxy lined 3' berm, good condition

Observed Douthett area in terms of plant at previous report identified - according to T.P. 19, no large containers.

On site lab generates misc. wastes / sat. area identified outside lab - formation pallet under concrete another sec. containment, outside bldg 401, rect. of generation - 1 drum per month gas w/ safety K10 to Green Valley Landfill in KY. - new SWMU.

Photo 10: Lab waste sat. area outside bldg. 401 facing W.

5/1/00

Photo 21: used ppe sat. area facing S. SWMU ~ 1 month for safety K10 to Green Valley ss. landfill, landfill.

Douthett - SWMU process area - verify, nor. haz. marked drum storage collection / debris from reactions - pursue from each line's gutter in drums - pictures not offered due to flammability of material - bldg. 407

Photo 22: take hazardous process area in drums in background w/ collection camp bldg. 407, photo 23: form a temp. used containers, stores / volatiles, peroxide - raw materials, concrete floor 3" in good condition, see previous notes

Photo 24: 150 gal. press. tank no longer used containing polymerized styrene (solid)

Photo 25: former methylene chloride cleaning stock pool / old tank / covered / current for K's have been used for methylene chloride cleaning - hydro last only cleaning method currently

AOC-D under bldg grade catalyst storage tank - this identified in 89 rpt. sec. containment concrete wall / flammable gas detected according to T.P. 11D.

5/5/00

- 1 - ABS Feed Pumps for ABS Feed System
Photo 26 sat acc. area for feed filters, rate of superheated steam - get back later - safety Klen
Photo 27: Gate. Waste container loading area bldg.
408 - good condition. No staining observed on pavement.
- 1 - Satellite Container Storage Area & the foam plant - Summary - Photo 28, some cracks and staining observed in storage area. No staining photo taken facing South. No drums stored in area at time of inspection.
- Photo 29: drainage ditch to the north / Summary
Photo 30: evaporative cooling tower in styron plant, Summary 27.
- 1 - Photo 31: pellets in washing area and sump / see notes from 5/4
- 1 - Photo 32: Solid waste dump - outside bldg. SS1 containing polystyrene - final products etc. facing east.
- 1 - Photo 33: spec. photo of storage area - outside bldg. 508 - 10 wooden pellets identified.
- 1 - In closer off spec. storage area (Summary 24) identified during SAUST due to construction

5/5/00

- outside entryway is therefore, unable to verify no. of off spec. products - according to how its still used.
- Photo 34: Summary 26. For K1, P4 washing area and sump, cracks in pavement observed, some staining also observed.
- Photo 35 - 37: Down plant aerial photo.
- Photo 38: Down plant entrance.
- Continued discussion - Summary in 139 ppt.
- Summary 27: drainage ditch to Big Thicket - finding closed rebar in rebar in front of pond.
- Rebar water from stormwater drainage system that goes through pump into drainage ditch to Big Thicket.
- Summary 24: drainage ditch to North - current lower end, tip stood. the pump plant in small sec. stormwater retention basin for collection of any spills from styron plant.
- Summary 25: current, except for water in gutter near pump.
- Summary 26: For K1, P4 Washing Area and sump: current except for water in gutter near pump.
- Summary 27: evaporative cooling tower - styron plant - according to spec. cooling tower blowdown would only contain small quantities of ethylbenzene, acrylonitrile, styrene, and polymerized material as reported.

S/S/08

1 1989 PAHST, the cooling water gathering, exchange
was not immediately possible according to Rep. Also,
biosphere is not in use.
SUMM 28-29: Evap cooling towers - Ethanol plant -
units removed in 1992.
SUMM 30: Process water system - still used, corrective
action in 1997 - a section of system removed/flushed
in 1997 - still also removed and transported as
non-hazardous to landfill in Michigan.
SUMM 31-35: wastewater treatment system/generating
clarifiers/chlorinator/sand filter - entire
system replaced in 1999 w/new WWT, pre-collection
basin, 200, 2 aerators, Charcoal filter, 2 sand filters,
SUMM 36: used filter sand pile - replaced - sand
from new WWT accumulated in transferred in
roll off box by SAPPX Kloer, transported to
Green Valley Land Fill in Smithfield, KY - rate of
generation ~ 500 lbs/yr ~ 1000 lbs per yr.
- by - Bioreactor peristaltic sledge (Mar-Apr) - trip
stimmed 199 lbs of the reactors and transferred
to roll off box and transported to Green Valley Land Fill
~ 500 lbs/yr generated.
SUMM 37: Wastewater treatment backwash dump - according
to rep. backwash dump no longer used - water treatment
system still exists but water goes to new WWT plant

S/S/00

former Y-12 pond -
SUMM 38: Y-12 pond - remediation done in 1997 see
closure RPT

SUMM 39: aerated skimmer basin - system failed
and remediated in 1992 - replaced w/ 2000 ft²
collection system.
SUMM 40: Downham container 500, 9191 - ~~was~~
identified during Y-12. According to rep. Downham
still used - superion, just for plant.
SUMM 41: diKymond Pile off collection: current,
biogrowth WWT.
SUMM 42: Recycle styrofoam cooling bath - according
to rep. contact cooling water would not contain soil
and is of chloroform, styrene, and cleaning agents
as reported in 1989 report.
SUMM 43: Twenty 250-gal. pressurized tanks - no
long used - only 2 remaining on site that contain
solid polymerized styrene, eliminated prior to 1995
status of AEC's identified during 1989 PAHST.
- AEC-A - styrene spill, no action taken, however soil
in 1989 was removed and spilled dump inspection
RPT. also stated that area has been lined w/clay and
AECed.
AEC-B - blowing agent release - current

5/5/0

AOC-C-process filter area - currently site
improved areas.

AOC-D - unit below grade catalyst storage tank
taken out of service 6 months ago, no longer in

AOC-E - anecdotal release info - no add'l
on these word of mouth findings.

* No other AOCs identified during this VST

[Signature]

5/5/00

VISUAL SITE INSPECTION SUMMARY

The Dow Chemical Company (Dow)
Hanging Rock Plant
Ironton, Ohio
OHD 039 128 913

Date: May 4 and 5, 2000

Primary Facility Representative: Dennis Stanley, Dow

Representative Telephone No.: (740) 533-4035

Additional Facility Representatives: Troy DeHoff, Dow

Inspection Team: Stan Lynn, Tetra Tech EM Inc. (Tetra Tech)
David Remley, Tetra Tech

Photographer: David Remley

Weather Conditions: Clear, sunny, 75 °F

Summary of Activities: The visual site inspection (VSI) began on May 4th at 10:00 a.m. with an introductory meeting. The inspection team explained the purpose of the VSI and the agenda for the visit. Facility representatives then discussed the facility's past and current operations, solid wastes generated, and release history. Facility representatives provided the inspection team with copies of requested documents.

The VSI tour began on May 5th at 8:00 a.m. Tetra Tech observed solid waste management units (SWMU) 1 through 40 and assessed the structural integrity of each SWMU. The tour concluded at 3:00 p.m., after which the inspection team held an exit meeting with facility representatives. The VSI was completed and the inspection team left the facility at 4:00 p.m.